

**UNITED STATES DISTRICT COURT
FOR THE DISTRICT OF COLUMBIA**

UNITED STATES OF AMERICA,)	
)	
Plaintiff,)	
)	Civil No. 99-CV-02496 (GK)
v.)	
)	Next scheduled court appearance:
PHILIP MORRIS USA INC.,)	
f/k/a PHILIP MORRIS INC., <i>et al.</i> ,)	Trial (ongoing)
)	
Defendants.)	
)	

WRITTEN DIRECT EXAMINATION

OF

NEIL WEINSTEIN, Ph.D.

SUBMITTED BY THE UNITED STATES PURSUANT TO ORDER #471

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Q: Dr. Weinstein, please introduce yourself to the Court.

A: I am Neil Weinstein.

Q: Have you provided the Court with a copy of your curriculum vitae?

A: Yes, it is U.S. Exhibit 78,542.

Q: What is your understanding of the expertise for which you are being offered in this case?

A: I understand that I am being offered as a psychologist with an expertise in risk perception.

Q: What is the subject matter of your testimony in this case?

A: My testimony describes and evaluates the evidence concerning public knowledge of the risks of smoking. In particular, I discuss four types of information central to comprehension of any hazard: (1) the nature of the ill effects that might occur; (2) the likelihood of these effects; (3) understanding of one's own personal vulnerability to harm, taking into account factors that may make their vulnerability different from that of other people; and (4) understanding of how easy or difficult it would be to avoid the harm.

Q: Applying these four factors, what conclusion do you reach?

A: I have concluded that people have a limited and superficial understanding of the risks of smoking and that their level of understanding is insufficient to make informed decisions about becoming smokers or continuing to smoke.

I. EXPERTISE

Q: Your professional experience has been in psychology, is that correct?

A: Yes. I was originally trained in the physical sciences and then received additional, post-doctoral training in psychology. Over my professional career, my research has primarily focused on three topics within health psychology -- namely, the study of risk perceptions,

1 risk communication, and health-protective behavior.

2 **Q: What is health psychology?**

3 A: Health psychology applies the concepts and methods of psychology to health, and
4 examines the ways in which beliefs, emotions, and behavior directly and indirectly
5 influence the likelihood of illness and likelihood of recovery from illness.

6 **Q: Can you explain the topics within health psychology you mention – risk perceptions,
7 risk communication, and health-protective behavior?**

8 A: Yes. These three topics are interconnected. The term “risk perceptions” refers to the
9 beliefs people have about hazards they may encounter. Such hazards include all types of
10 diseases, but also natural and manmade disasters, and even financial harm. These risk
11 perceptions may be accurate or inaccurate. “Risk communication” refers to the process of
12 providing information about hazards to audiences. A synonym might be “risk education.”
13 “Health-protective behavior” refers to the actions people can take to influence their
14 health, including actions that increase or decrease the likelihood of illness, and also
15 actions that lay people can take that influence the detection of illness and the successful
16 recovery from illness. Much of health-protective behavior is influenced by risk
17 perceptions, and one of the most important goals of risk communication is to encourage
18 healthy behaviors by producing accurate understandings of hazards.

19 **Q: What has your research focused on?**

20 A: My research has investigated how people form risk perceptions, how risk communication
21 can be used to create more accurate risk perceptions, and how risk perceptions and other
22 factors influence health behavior. The ultimate goal of all these activities is to find ways
23 of reducing the burden of illness and injury.

1 ***A. Education***

2 **Q: Please tell the Court about your educational background.**

3 A: In 1966, I received a Bachelor of Science degree in Chemistry from the University of
4 Wisconsin. In 1972, I received a Ph.D. in Chemical Physics from Harvard University.

5 **Q: Did you undertake further study following your Ph.D.?**

6 A: Yes. Following my Ph.D., I decided to refocus my scholarship on the study of human
7 behavior rather than physical science. I received a fellowship to accomplish this goal
8 from the National Institute of Mental Health (NIMH). From 1972 to 1974, I was an
9 NIMH Postdoctoral Fellow in the Department of Psychology at the University of
10 California, Berkeley.

11 **Q: What was the area of your study at the University of California, Berkeley?**

12 A: I focused on psychological stress and environmental psychology. In particular, I studied
13 how people respond to difficult and threatening situations. I examined stress arising from
14 environmental conditions, rather than stress from interpersonal or internal conflicts.

15 ***B. Employment Positions***

16 **Q: What position of employment did you enter following your postdoctoral fellowship
17 at the University of California, Berkeley?**

18 A: In 1974, I became a faculty member in the Department of Human Ecology at Rutgers, The
19 State University of New Jersey.

20 **Q: Are you currently still on the Rutgers faculty?**

21 A: Yes, I have been on the faculty at Rutgers since 1974.

22 **Q: How would you describe the discipline of human ecology?**

23 A: As used at Rutgers, "human ecology" refers to the study of the interconnections between

1 people and their physical environment. It examines the effects of human actions on the
2 physical environment in which they live and also the effects of the environment on human
3 beings.

4 **Q: Please tell me the different positions that you have held at Rutgers.**

5 A: From 1974 to 1980, I was an Assistant Professor in the Department of Human Ecology. I
6 was an Associate Professor in the Department of Human Ecology from 1980 to 1987, and
7 Professor in that department from 1987 to 1998. In 1985, I served as Acting Chair of the
8 Department of Human Ecology, and served as the Chair of that department from 1994 to
9 1997.

10 **Q: What were your responsibilities as the Chair of the Department of Human Ecology
11 at Rutgers?**

12 A: As Chair, I guided all aspects of departmental business, including appointments and
13 promotions, undergraduate curriculum, planning, financial administration, and the
14 preparation of reports to the college and university.

15 **Q: What is your current position at Rutgers?**

16 A: I hold the rank of Professor II (analogous to Distinguished Professor) in the Department
17 of Human Ecology at Rutgers. I also am a member of the Graduate Program in
18 Psychology at Rutgers and am the Director of the Theories Project at the National Cancer
19 Institute. I am an Adjunct Professor in the School of Public Health at the University of
20 Arizona and an Associate Member of the Arizona Cancer Center.

21 **Q: What are your responsibilities as Professor of Human Ecology at Rutgers?**

22 A: I teach undergraduate-level courses on topics that concern human-environment
23 interactions; I teach graduate-level courses in psychology; I supervise and advise both

undergraduate and graduate students; I carry out research related to my areas of expertise; and I serve my department, the university, and the public at the state and national levels.

Q: From 1974 to the present, have you taught both undergraduate and graduate students at Rutgers?

A: Yes.

Q: How many undergraduates do you estimate that you have taught over those thirty years?

A: Between two and three thousand.

Q: And how many graduate students?

A: About 150.

Q: What undergraduate courses have you taught?

A: At the undergraduate level, I have taught Health Psychology; Environmental Psychology; Statistics; Environmental Behavior; Social Aspects of Environmental Planning and Design; Practicum in Environmental Protection; Research Methods in Human Ecology; and Psychological Stress. In recent years, I have most often taught Environmental Behavior and Research Methods in Human Ecology.

Q: Could you please explain the topics that you cover in your course on Environmental Behavior?

A: Yes. This course covers persuasion and behavior change, with a focus on changing behaviors that harm environmental quality. In this course, I explore different psychological issues – such as motivation, decision making, attitudes, emotion, values and incentives – and show how knowledge of these issues can be used to encourage environmental protection at the level of the individual citizen

1 **Q:** **Could you please explain the topics that you cover in your course on Research**
2 **Methods in Human Ecology?**

3 A: This is a course on research strategies for studying social and behavioral issues. In this
4 course, I discuss the scientific method, generation of hypotheses, making hypotheses
5 operational, data collection techniques – such as observation, surveys, and experiments –
6 and data interpretation.

7 **Q:** **What graduate courses have you taught?**

8 A: The graduate classes I have taught are Stress, Coping, and Adaptation; Theories of Health
9 Behavior; Research Methods in Social Psychology; and Practicum in Field and Applied
10 Research. In recent years I have taught Practicum in Field and Applied Research and
11 Theories of Health Behavior.

12 **Q:** **Could you please explain the topics that you cover in your course Theories of Health**
13 **Behavior?**

14 A: This course covers the major theories that explain the causes of behaviors that influence
15 health. In addition to describing these theories, I discuss their similarities and
16 differences, the constructs that make up these theories, and the ways in which health
17 behavior theories are and ought to be tested.

18 **Q:** **Could you please explain the topics that you cover in your course Practicum in Field**
19 **and Applied Research?**

20 A: The lecture component of this course covers two main topics: survey research and quasi-
21 experimental design. A practicum is the supervised practical application of theory. In the
22 practicum part of the course, students design research plans for organizations (mostly
23 nonprofit) that have research needs but lack resources to conduct this research.

1 **Q: In addition to your employment at Rutgers, have you been employed at other**
2 **universities or institutions?**

3 A: Yes. I have been employed by the National Cancer Institute to work on a number of
4 different projects. Additionally, I have been a visiting faculty member at the University
5 of Arizona and the Oregon Health Sciences University.

6 **Q: Please describe your position and responsibilities at the National Cancer Institute.**

7 A: From 2000 to the present, I have served as a visiting scientist in the Behavioral Research
8 Program in the Division of Cancer Control and Population Sciences at the National
9 Cancer Institute in Bethesda, Maryland. At times this role has taken the form of a paid
10 temporary appointment, and at other times my work has been carried out as a consultant
11 or a contractor. In these various roles, I developed the NCI online risk communication
12 bibliography and the smoker's risk website. I organized a number of workshops for
13 fellow researchers, including workshops on risk perception and on avenues for improving
14 theories of health behavior. I also led the 2004 Advanced Training Institute in Health
15 Behavior Theory, which had the goal of educating the nation's top postdoctoral fellows
16 and assistant professors about theory development and testing.

17 **Q: Please describe your positions at the University of Arizona and the Oregon Health**
18 **Sciences University.**

19 A: In 1983, I was a Visiting Scholar in the Department of Medical Psychology at the Oregon
20 Health Sciences University. In 1987, I was a Visiting Scholar at the University of
21 Arizona in the Department of Psychology. In 2002, I was a Visiting Scholar in the
22 Arizona Cancer Center. These were unpaid positions through which I interacted with
23 faculty and gave guest lectures.

1 ***C. Research and Publications***

2 **Q: What is the focus of your research?**

3 A: For the past 25 years, my research has emphasized risk perception, risk communication,
4 and health-related behavior. My research has examined how individuals respond to a
5 wide range of health and safety hazards, from seat belt use to cancer treatment decisions.

6 **Q: Have you received funding to support your research in risk perception?**

7 A: Yes. Over the past three decades, I have received more than a million dollars in grant
8 support for my research on risk from various organizations, including the National
9 Institute of Mental Health, the National Cancer Institute, the SmithKline Beecham
10 Pharmaceutical Corporation, and the State of New Jersey, to perform research on radon,
11 lyme disease, risk communication, and other topics. One of these grants, from the Robert
12 Wood Johnson Substance Abuse Policy Research Program, specifically focused on
13 smoking.

14 **Q: What is the primary type of research that you conduct?**

15 A: Nearly all of my research involves various forms of survey research. Since the 1970s,
16 essentially all of the investigations I have directed gathered self-report data derived by
17 interview or questionnaire. Self-report data are one of the distinguishing features of
18 survey research. In addition, many of my published studies obtained these self-report
19 data from random population samples. Population sampling constitutes a second key
20 attribute of survey research. I wrote all or a large proportion of the
21 interview/questionnaire questions in these studies and designed or helped to design all the
22 sampling and data collection strategies.

23 **Q: On what topics have you conducted survey research?**

1 A: My studies have included both random sampling and self-report data and cover a wide
2 range of topics, including smoking, lyme disease, radon, tornadoes, and health threats in
3 general. The samples in these studies have included: adolescent and adult smokers and
4 nonsmokers in the United States; residents of areas at especially high-risk for lyme
5 disease or for home radon problems; residents of towns recently experiencing natural
6 disasters; and residents of particular states or counties. The data collection methods used
7 by these studies have included both telephone interviews and telephone recruitment calls
8 followed by mailed questionnaires.

9 **Q: Why do you use surveys to examine risk perception?**

10 A: Since we cannot measure knowledge and beliefs directly (that is, we can not look into
11 people's minds), these topics are normally examined with self-report data in which
12 interviewers or questionnaires pose questions to people and obtain their responses. These
13 data-gathering approaches are the most direct approaches for learning about knowledge
14 and beliefs. They are also relatively economical methods.

15 **Q: Are survey and questionnaire data reliable?**

16 A: Like any other scientific method, interviews and questionnaires yield reliable data only if
17 they are used carefully. Answers can be biased deliberately or inadvertently by those who
18 pose the questions or those who answer. Questions can also be too vague or difficult to
19 answer, leading to responses that are relatively meaningless even though they are not
20 biased in a particular direction. Because different question wordings can elicit different
21 answers, it is important to ask questions with alternative wordings (either in the same
22 study or in different studies) and examine the stability of the responses before reaching
23 any definitive conclusions about the topic being investigated.

1 **Q: What surveys have you conducted?**

2 A: I have carried out a large number of studies that obtained data from questionnaires or
3 interviews (both of which can be considered surveys). In fact, only a few of the greater
4 than 65 refereed articles listed in my curriculum vitae collected data by other means (such
5 as by direct observation). Some examples of the groups and topics I have investigated
6 with surveys include the following: smokers and nonsmokers surveyed about smoking;
7 fishermen catching fish in polluted waters surveyed about what they do with their catch;
8 people living in areas at high risk for radon surveyed about their radon knowledge and
9 about home radon testing; coffee drinkers asked about the safety of coffee; county
10 residents questioned about personal health risks; visitors to state parks interviewed about
11 precautions they have taken against lyme disease; and university students and faculty
12 surveyed about flu and flu vaccination. In total, I have designed and supervised dozens of
13 interviews or questionnaire studies, including at least 10,000 individual respondents.

14 **Q: In your publications, do you also rely upon surveys conducted by other researchers
15 in reaching your conclusions?**

16 A: Yes.

17 **Q: How do you decide whether you can rely upon results of surveys that you did not
18 conduct yourself?**

19 A: I take several factors into consideration. One of these is the methodology of the survey,
20 which includes the sample, the interviewing procedures, and the survey content. I also
21 consider the data analyses and the validity of the conclusions drawn from the data. Also,
22 I consider how the results compare with those of other published studies on the same
23 topic. Publication in a refereed journal is an indication that some of my peers have also

1 scrutinized the work and found it can be relied upon, and this helps me in deciding
2 whether the results are trustworthy.

3 **Q: Has your research been published?**

4 A: Yes. My publications are listed on my curriculum vitae, which is U.S. Exhibit 78,542. I
5 have published many refereed research articles, books, and book chapters, as well as
6 numerous other publications and reports.

7 **Q: What is a refereed research article?**

8 A: It is an article that is initially submitted to a journal with no promise that it will be
9 published. The submission is examined by reviewers known as “referees” who decide if
10 its quality and potential impact are sufficiently great that it should be published. In
11 general, many submitted articles are not published, and rejection rates at more selective
12 journals run as high as 90%.

13 **Q: Approximately how many refereed research articles have you published?**

14 A: I have published, either individually or with other authors, over 65 refereed research
15 articles.

16 **Q: On what particular topics have you published?**

17 A: During the last 25 years, nearly all of my publications have dealt with risk perception, risk
18 communication, or health behavior. Some are empirical studies concerning specific
19 health or safety topics, such as smoking, home radon testing, seat belt use, colorectal
20 cancer, lyme disease, tornadoes, and HIV prevention. Some of my publications are
21 examinations of methodology and analysis issues, including how to measure risk
22 perceptions and how to analyze data on risk perceptions that come from different types of
23 research designs. Finally, some of my publications focus on theory development, both on

1 approaches for theory testing and on the theory that I created with Dr. Peter Sandman
2 called the Precaution Adoption Process Model.

3 **Q: Of all the publications listed in your curriculum vitae, how many specifically
4 address risk perception as it pertains to cigarette smoking?**

5 A: I have published a total of 5 refereed articles (1 of which is in press) that focus
6 specifically on smoking. One of these articles has been updated and reprinted twice, once
7 in a book chapter and once in another refereed journal.

8 **Q: Can you describe these refereed research articles?**

9 A: Yes. I was the sole author of a refereed research article appearing in the Annals of
10 Behavioral Medicine in 1998 that reviewed and critically assessed research conducted on
11 the accuracy of smokers' risk perceptions. I was the sole author on a peer-reviewed
12 article appearing in the Journal of the National Cancer Institute in 1999 that discussed the
13 measurement of risk comprehension from the perspective of smoking. I was the lead
14 author of a 2004 refereed research article published in the journal Nicotine and Tobacco
15 Research dealing with public understanding of the illnesses caused by smoking. I was the
16 lead author of a peer-reviewed article published in 2004 in Nicotine and Tobacco
17 Research that examined the accuracy of beliefs about quitting. Finally, I am the lead
18 author on a peer-reviewed article in press in Tobacco Control that looks at the accuracy of
19 risk perceptions in the National Cancer Institute's HINTS survey data.

20 **Q: Have you given any presentations at professional meetings on the subject of risk
21 perception?**

22 A: Yes. I regularly present my work to other scholars. I have, either individually or with
23 other presenters, given presentations at over 70 professional conferences and workshops

1 on the subject of risk perception or risk communication.

2 **Q: Did any of your presentations on risk perception discuss cigarette smoking?**

3 A: Yes. In about a dozen of these presentations, I have focused on risk perceptions about
4 cigarette smoking. For example, I have given presentations describing the public's
5 understanding of smoking risks at such venues as the National Cancer Institute, Memorial
6 Sloan-Kettering Cancer Center, the City University of New York, the Society for
7 Research on Nicotine and Tobacco, and the University of Savoie in Chambery, France.

8 **D. Consulting**

9 **Q: Have you consulted with any public health or governmental bodies on matters
10 involving risk perception?**

11 A: Yes. I have consulted on matters involving risk perception with the National Cancer
12 Institute (NCI), New Jersey Department of Health, Institute of Medicine, United States
13 Department of Housing and Urban Development, World Health Organization, Centers for
14 Disease Control and Prevention (CDC), United States Environmental Protection Agency,
15 and the National Safety Council.

16 **Q: Did any of your consulting work involve risk perception as it pertains to cigarette
17 smoking?**

18 A: Yes, I have undertaken three different consulting projects with the National Cancer
19 Institute related to cigarette smoking and risk perception.

20 **Q: Please describe the first consulting project.**

21 A: First, from 2000 to 2004 I led the project that resulted in the "Smoker's Risk" website
22 (<http://cancercontrol.cancer.gov/tcrb/smokersrisk>). This website allows smokers to
23 obtain individualized risk estimates for lung cancer and for mortality from all causes that

1 reflect their own smoking history. Smokers can then compare their risk to that of
2 nonsmokers and to what their risk would be if they quit.

3 **Q: What was the second consulting project you conducted for the National Cancer
4 Institute?**

5 A: From 2001 to 2003, I helped to design the smoking questions that were asked in the
6 Health Information National Trends Survey (HINTS), a biannual survey of cancer
7 communication and knowledge issues.

8 **Q: What was the third consulting project you conducted for the National Cancer
9 Institute?**

10 A: I was an invited contributor to the National Cancer Institute report entitled Monograph
11 13: Risks Associated With Smoking Cigarettes With Low-Machine-Measured Yields of
12 Tar and Nicotine that was published in 2001. (U.S. Exhibit 58,700).

13 **Q: What were your responsibilities as an invited contributor to Monograph 13?**

14 A: I participated in the group that planned the Monograph. Additionally, I wrote a chapter of
15 the Monograph entitled “Public Understanding of Risk and Reasons for Smoking Low
16 Yield Products.” As its title suggests, my chapter was an overview of the research that
17 has examined public beliefs about so-called “light” and “ultralight” cigarettes. The
18 chapter covered public beliefs and knowledge about the composition and safety of these
19 cigarettes, the reasons why people choose to smoke them, and the effects of choosing
20 these cigarettes on the likelihood that smokers of these light cigarettes will subsequently
21 quit smoking.

22 **Q: Have you served as a consultant to any governmental or nonprofit organizations?**

23 A: Yes. I have been a consultant to such agencies as the World Health Organization, the

1 NCI, United States Environmental Protection Agency, CDC, Department of Housing and
2 Urban Development, National Institute for Occupational Safety and Health, National
3 Safety Council, and American Lung Association. I also advised the United States Armed
4 Forces on health matters as a member of the Armed Forces Epidemiology Board.

5 **Q: Have you served as a consultant in any other capacity?**

6 A: Yes. I regularly serve as a paid consultant to investigators at other academic institutions.
7 I assist them in articulating their research questions, planning their interventions and
8 assessment strategies, and analyzing their data. I have performed such consulting work
9 for researchers at Harvard University, Memorial Sloan-Kettering Cancer Center, Duke
10 University, Johns Hopkins University, Iowa State University, the University of
11 Massachusetts, Thomas Jefferson Medical School, and the University of Colorado.

12 **E. Journals, Professional Societies and Awards**

13 **Q: Are you a member of any professional societies?**

14 A: Yes. At present, I am a member of the American Psychological Association and the
15 Society of Behavioral Medicine.

16 **Q: Have you received any academic or professional honors or awards?**

17 A: Yes. I have been chosen by my peers to be designated a fellow of two divisions of the
18 American Psychological Association, namely the Division of Health Psychology (1996)
19 and the Division of Population and Environmental Psychology (1989). I was invited to
20 deliver the inaugural "Hochbaum Lecture on Health Behavior and Health Education" at
21 the University of North Carolina, a lecture named in honor of Godfrey Hochbaum, one of
22 the fathers of health behavior research (1989). In addition, in 2003, I received the
23 Rutgers University Trustees Award for Research Excellence. I was also the first

1 behavioral scientist to have been appointed to the Armed Forces Epidemiological Board
2 (1998-2000).

3 **Q: Please explain to the Court why you received the Rutgers University Trustees
4 Award for Research Excellence in 2003.**

5 A: This award is given annually to three members of the faculty, out of several thousand,
6 whose research has had outstanding national and international impact. My own citation
7 emphasized my contributions to understanding risk perceptions and health behavior in
8 general. More specifically, it was based on my studies of unrealistic optimism and on my
9 work in developing a theory of health behavior, the Precaution Adoption Process Model,
10 that has received wide attention.

11 **Q: Have you served on the editorial boards of any professional journals?**

12 A: Yes. I have served on the editorial boards of four professional journals, and currently
13 serve on the boards of the British Journal of Health Psychology and the Journal of
14 Applied Social Psychology.

15 **Q: Have you served as a reviewer for any publications?**

16 A: Yes. I am a regular or occasional reviewer for dozens of professional and academic
17 journals. These range from general journals in psychology, such as the Journal of
18 Personality and Social Psychology and the Journal of Applied Social Psychology, to more
19 focused journals, such as Health Psychology and Health Education Research, to journals
20 on specific topics, such as Nicotine and Tobacco Research and Risk Analysis. On
21 average, I serve as a reviewer for 15 to 20 journal submissions a year. I also review grant
22 applications submitted to funding agencies in the United States and other countries.

23 **F. Expert Work**

1 **Q:** **Have you offered opinions, in the form of expert reports or testimony, in other**
2 **tobacco related cases in which one or more of the Defendants in this case was a**
3 **party?**

4 **A:** Yes.

5 **Q:** **In what cases?**

6 **A:** I served as an expert in Simon v. Philip Morris et al., in the Eastern District of New York;
7 Massachusetts v. Philip Morris et al., in the Superior Court of Massachusetts; In the
8 Matter of R.J. Reynolds Tobacco Co., before the Federal Trade Commission; and Brown
9 et al. v. American Tobacco Company, Inc., et al., in the Superior Court of the State of
10 California for the County of San Diego. I have also been engaged as an expert in City of
11 St. Louis et al. v. American Tobacco Company, Inc., et al. in the Circuit Court of the City
12 of St. Louis, State of Missouri.

13 **Q:** **What was the nature of your involvement in each of those cases?**

14 **A:** In each case I was an expert on risk perception as it relates to smoking. In particular, in
15 all these cases, I addressed the accuracy and completeness of the beliefs lay people have
16 about the risks of smoking and of addiction and the extent to which they form an
17 adequate foundation for an informed judgment about smoking initiation or cessation. In
18 the Brown case, I especially focused on lay people's beliefs about low-tar cigarettes. I
19 have testified at trial only for the Federal Trade Commission. I have been deposed in all
20 other cases except the City of St. Louis, for which a deposition is scheduled later this
21 year.

22 **Q:** **Have you ever been found by a judge not to be qualified to testify as an expert?**

23 **A:** No.

1 **Q: Dr. Weinstein, what compensation do you receive from the United States for your**
2 **engagement as an expert in this case?**

3 A: I have been compensated at the rate of \$275 per hour in connection with my work in this
4 case until September, 2004. For that time to the present, I am compensated at the rate of
5 \$300 per hour.

6 ***II. CONCLUSIONS***

7 **Q: What testimony were you asked to provide in this case?**

8 A: In general terms, I was asked to describe and evaluate the evidence concerning public
9 knowledge of the risks of smoking.

10 **Q: On what did you rely to provide that testimony?**

11 A: I relied upon research I conducted using survey methodology and also examined relevant
12 published literature. In forming my conclusions, I reviewed the literature on risk
13 perception generally, and risk perceptions with regard to smoking specifically. I also
14 reviewed reports concerning the epidemiological risks of smoking, as well as smokers'
15 and nonsmokers' beliefs about smoking-related risks. I previously reviewed all available
16 published articles concerning people's perceptions of the risks from smoking. The most
17 recent update of that review, titled, "Smokers' Recognition of Their Vulnerability to
18 Harm" was published in 2001. U.S. Exhibit 17,736 (Weinstein, 2001). A number of my
19 conclusions come from this review.

20 I also conducted substantial survey work. In collaboration with Dr. Paul Slovic,
21 and with support from the Robert Wood Johnson Foundation, I conducted in 2000-2001 a
22 national survey of 776 randomly selected smokers and nonsmokers. U.S. Exhibit 17,736
23 (Weinstein & Slovic, 2001). Half were teens between 15 and 19 and the rest were over

1 19. I rely on the data from this survey in forming my conclusions. I also rely on a
2 national survey of 3,506 smokers and nonsmokers, young people 14-22 years old and
3 adults, conducted in 1999-2000 for the Annenberg School of Communication at the
4 University of Pennsylvania. U.S. Exhibit 17,736 (Annenberg, 2000). I further rely upon
5 the 2002 Health Information National Trends Survey ("HINTS Survey") conducted by the
6 National Cancer Institute and released to the public on the internet on February 17, 2004,
7 for which I was an advisor. U.S. Exhibit 17,736 (HINTS Survey, 2004).

8 **Q: What conclusion have you reached?**

9 A: My conclusion is that people have a limited and superficial understanding of the risks of
10 smoking. My conclusion is based upon my analysis of four factors that show the level of
11 understanding individuals have about the risks of smoking.

12 **Q: What are those four factors?**

13 A: The four factors are: (1) the nature of the ill effects that might occur; (2) the likelihood of
14 these effects; (3) one's own personal vulnerability to harm, taking into account factors
15 that may make their vulnerability different from that of other people; and (4) how easy or
16 difficult it would be to avoid the harm. There is abundant evidence that people are
17 influenced by their beliefs about these four issues when making decisions. These four
18 factors reflect a straight forward application of basic laws of probability to the smoking
19 context. For any uncertain event (such as the chance of becoming ill), the laws of
20 probability tell us that the expected outcome (i.e., the expected amount of loss or gain) is
21 a function of both the probability that the outcome will occur (the first factor) and the
22 magnitude of that outcome (the second factor). For this reason, an informed evaluation of
23 any decision involving risk—a financial investment, the design of an engineering safety

1 system, the choice of treatment for a serious illness, etc.–must take both probability and
2 magnitude into consideration. U.S. Exhibit 17,736 (Baron, 2000). This risk can then be
3 adjusted to take personal factors into account that might modify the likelihood or
4 magnitude of harm (the third factor). Equally important in any risk-related decision is a
5 consideration of the difficulty of avoiding harm (the fourth factor).

6 **Q: On what do you base these four factors?**

7 A: These four factors are either explicit or implicit components in both normative and
8 descriptive theories of decision making. Normative theories specify what people ought to
9 consider if their goal is to minimize the harm that they will experience. As these factors
10 tend to be reflected in actual decision making, nearly all of the descriptive theories used
11 to explain individual actions in risky decisions include both perceptions of the likelihood
12 of potential harmful outcomes (i.e., risk probabilities) and the potential seriousness of
13 these outcomes (i.e., outcome magnitude) among their core variables, even though these
14 theories differ in other respects. Examples of such theories that are used to understand
15 health-related behaviors include the Health Belief Model, Subjective Expected Utility
16 Theory, and Protection Motivation Theory.

17 **Q: Do actual decisions always coincide with normative theories?**

18 A: No, it is not true that actual decision making always coincides with the prescriptions of
19 normative theories. Many real decisions are based on incorrect information or use this
20 information incorrectly (the decisions, for example, overemphasize the nature of the harm
21 and pay little attention to the probability of harm), so that the actual decisions are not the
22 same as the optimal decisions.

23 **Q: Are there other factors that could also be considered?**

1 A: Yes. Social and economic costs could be added to health risk considerations.
2
3 Additionally, a complete analysis of a decision problem would involve a separate review
4 of these four factors for each of the available choices, not just the choice being examined
5 at the moment. Still, without the four factors of information I specify, any analysis of the
6 risk that would be created by starting or continuing smoking would certainly be
7 incomplete.

8 **Q: Applying these four factors, what conclusion have you reached about each?**

9 A: First, although most people agree with the general statement that smoking is unhealthy,
10 they have little knowledge of the nature of the illnesses that can be caused. Second, they
11 also have little knowledge of the extent to which smoking increases the likelihood of
12 these illnesses. Third, people minimize the personal relevance of these risks, believing
13 that, while smoking may be risky for others, these same risks do not apply to themselves.
14 When people think about their own risk and contrast it to that of other people, they tend
15 to reach the comforting, though distorted, conclusion, that their own risks are less than
16 those of a typical smoker. In other words, they tend to deny that they, personally, are at
17 risk. Fourth, although smokers agree with the general statement that quitting smoking
18 can be difficult, they nevertheless greatly overestimate the likelihood that they will be
19 successful in their next quit attempt. Adolescent smokers, specifically, underestimate the
20 harmful consequences of smoking, substantially underestimating their own risk of
21 becoming addicted to cigarettes and the difficulty they will have quitting.

22 **Q: Can you provide a definition for the term “risk”?**

23 A: The term “risk” is used in several quite different ways in both lay and professional
24 communication. Like others in the field, I use the term “risk” in several senses, but try to

1 make clear which meaning I intend by the context.

2 “Risk” can refer to the nature of the harm that may occur in a situation, as in
3 “What are the risks of smoking?” To this question, one might answer that the risks
4 include lung cancer, heart disease, emphysema, and other illnesses. Although I am not an
5 expert on the health effects of smoking, other health effects of smoking that are
6 frequently mentioned in the mass media include, for example: lung cancer, cancers of the
7 mouth, tongue and esophagus, and cancers of several other internal organs; increased risk
8 of heart disease and stroke; increased risk of chronic obstructive pulmonary disease,
9 asthma, and chronic bronchitis; smoking increased the risk of miscarriage or of low birth
10 weight in newborn children and the likelihood of infertility and impotency, and increased
11 the risk of several of these ailments in nonsmokers exposed to tobacco smoke.

12 “Risk” may refer to the probability of harm, as in, “What is the risk of lung cancer
13 if you smoke a pack of cigarettes a day?”

14 One might also speak of smoking being a “risk,” in which case one is referring to
15 an action or agent that has a substantial likelihood of causing harm. When used in this
16 way, “risk” and “hazard” are synonyms.

17 It is my conclusion that understanding both the nature of the harm that might
18 occur and the probability of this harm are essential aspects of understanding any hazard,
19 including smoking.

20 **Q: Do risk perceptions affect whether or not someone begins to smoke?**

21 A: Yes. There is considerable evidence demonstrating that risk perceptions are linked to
22 smoking initiation and progression. For example, a peer-reviewed published study found
23 that beliefs about the likelihood of illness from smoking predicted which 7th grade

1 nonsmokers began smoking over the next 15 months and which 7th grade experimental
2 smokers increased their rate of smoking over this same period. U.S. Exhibit 17,736 (Flay
3 et al., 1994).

4 **Q: Are perceptions of risk an important factor in the decision to quit smoking?**

5 A: Yes. Studies consistently show that concerns about health are the reason people give
6 most often to explain why they stop or try to stop. The 20-community COMMIT study,
7 with 6,603 smokers, asked all those who made a serious quit attempt for their reasons for
8 trying to quit. As reported in a refereed article, “concern for your own current or future
9 health” was cited by over 90% of respondents, far more than those endorsing any other
10 reason. U.S. Exhibit 17,736 (Hyland, Qiang, Bauer, Giovino, Steger & Cummings, 2004).

11 In my own research, 74% of smokers who said their risk was greater than that of other
12 smokers say they intend to quit compared to only 50% of smokers who said their risk was
13 less than that of other smokers. U.S. Exhibit 17,736 (Weinstein & Slovic, 2001). A peer-
14 reviewed published study found that perceptions of personal vulnerability to smoking-
15 related disease predicted which employees participated in a work-site smoking-cessation
16 program. U.S. Exhibit 17,736 (Klesges et al., 1988a). Furthermore, in two community
17 samples, another peer-reviewed published study found that smokers who had attempted to
18 quit knew more about which illnesses were caused by smoking than smokers who had not
19 attempted to quit. U.S. Exhibit 17,736 (Klesges et al., 1988b).

20 **Q: Are perceptions of risk related to decisions to smoke light or ultralight cigarettes?**

21 A: Yes. Surveys have shown consistently that a perception of reduced risk is one of the
22 major reasons why smokers choose so-called “light” or “ultralight” cigarettes. In a
23 typical example, a national telephone survey revealed that 58% of ultralight cigarette

1 smokers and 39% of light cigarette smokers agreed that they “smoke [Light or Ultra-light]
2 cigarettes to reduce the risks of smoking without having to give up smoking.” U.S.
3 Exhibit 17,736 (Kozlowski, Goldberg et al., 1998) (bracketed text in original).

4 ***A. Factor One: Nature of the Potential Harm***

5 **Q: Please remind the court of the first factor.**

6 A: It is individuals’ understanding about the nature of the potential harm from smoking.

7 **Q: How would you characterize individuals’ knowledge about the nature of the
8 potential harm from smoking?**

9 A: This question can be divided into two parts. The first part of the question is whether
10 people know what illnesses and other significant health effects can be caused by smoking.
11 This refers to the identity (i.e., names or approximate names of the illnesses) of the health
12 consequences of smoking. To make an informed choice about exposing oneself to
13 potential harm, one must know what kinds of harm might occur.

14 The second part of the question is whether people really have an understanding of
15 the nature of these health consequences. Citing the name of an illness does not mean that
16 someone has any real appreciation for what it is like to have this illness, whether it can be
17 treated, whether it is life-threatening, what pain and suffering it may cause, and other
18 similar considerations.

19 **Q: Why do you break this question into two parts?**

20 A: Being able to judge the severity of a hazard or risk requires more than a vague
21 understanding that an activity is “bad for you” or that it “causes cancer.” Unless a person
22 has a reasonably thorough knowledge of the undesirable consequences of that activity –
23 both what outcomes can occur and how serious these outcomes are – he or she is not in a

1 position to decide whether the risk is worth taking. Answers to these two questions show
2 whether the public understands the magnitude of harm that might occur from the illnesses
3 caused by, or made more likely by, smoking.

4 **Q: What conclusion have you reached about individuals' understanding of the health
5 consequences of smoking?**

6 A: Most individuals, including current smokers, do not have an accurate understanding of
7 the health consequences of smoking. What knowledge they do have is vague and
8 superficial.

9 **Q: Please describe the kind of information that you relied upon to reach this
10 conclusion.**

11 A: My conclusion about the public's understanding of these issues is based substantially on
12 two careful, large-scale surveys. For example, in the Annenberg smoking survey, people
13 were asked what illnesses can be caused by smoking, and they were gently prodded to add
14 other illnesses until no more came to mind. The results were similar for smokers and
15 nonsmokers, adults and youth. Overall, the average survey respondent could think of
16 only two out of the many illnesses caused by smoking. Only 87% mentioned lung cancer;
17 17% mentioned throat cancer; and 14% mentioned cancer of the mouth. About half,
18 49%, could think of emphysema, and another 8% mentioned bronchitis. Heart disease
19 was mentioned by only 21% of respondents, with stroke cited by less than 2%. The
20 survey Dr. Slovic and I conducted found very similar results. U.S. Exhibit 17,736
21 (Weinstein et al., 2004a; Jamieson & Romer, 2001; Annenberg, 2000).

22 **Q: What does this research show about what illnesses people think are caused by
23 smoking?**

1 A: This research shows that, without being prompted, many people cannot identify even the
2 most serious and frequent illnesses caused by smoking. It is true that when lung cancer,
3 emphysema, or heart disease are specifically mentioned to survey respondents, most will
4 agree that smoking cigarettes can cause those illnesses. However, most respondents
5 cannot identify these illnesses without being prompted. Prompted recall is a much more
6 lenient measure of knowledge than unprompted recall. As the survey data I just
7 mentioned show, lung cancer, heart disease, and emphysema are the diseases most
8 commonly associated with smoking by the lay person. Yet, about one person in eight still
9 can not tell you that smoking causes lung cancer; only one in four mentions cancer of the
10 throat or mouth; less than one in four can cite heart disease in connection with smoking;
11 and only a minimal number can mention any other life threatening illnesses caused by
12 smoking, such as asthma, chronic bronchitis, or stroke. Similar results were also reported
13 by Wewers and colleagues. U.S. Exhibit 17,736 (Wewers et al., 2000).

14 **Q: Do smokers uniformly state that smoking is harmful or dangerous, even if they
15 cannot name all diseases smoking causes?**

16 A: As recently as 1989, substantial portions of the United States population had doubts about
17 smoking effects. For example, according to data from polls in 1986 and 1987 reported in
18 the 1989 Report of the Surgeon General, 27% of smokers did not agree that smoking
19 causes heart disease; 17-25% did not agree that cigarette smoking causes lung cancer; and
20 15-29% did not believe that smoking causes emphysema or chronic bronchitis. U.S.
21 Exhibit 63,621. More recently, 35% of smokers said that they thought the harmful effects
22 of cigarettes have been exaggerated, and 40% did not accept the idea that smoking is
23 “very dangerous.” U.S. Exhibit 17,736 (Annenberg, 2000, and McMillen et al., 2000,

1 respectively).

2 **Q: What is the significance of these research findings?**

3 A: If individuals can mention few of the most severe health effects of smoking without
4 prompting, then these potential health effects will not be considered when deciding
5 whether to smoke. Furthermore, a substantial percentage of smokers still harbors doubts
6 about whether smoking causes various diseases and believes that the risks of smoking
7 have been exaggerated.

8 **Q: Now that you have stated your conclusion about smokers' knowledge of what
9 outcomes can occur from smoking, what conclusion have you reached about
10 smokers' knowledge about how serious these outcomes are?**

11 A: A large majority of the public underestimates the severity of the illnesses caused by
12 smoking. Knowing the name of an illness is one thing. Knowing what it is like is
13 another. The more closely one looks at what people really know about smoking, the more
14 incomplete their knowledge is found to be.

15 **Q: What is your basis for this conclusion?**

16 A: It is based upon the peer-reviewed research I have conducted. When asked what they
17 know about the pain and suffering caused by lung cancer, 47% of adults and 63% of teens
18 said "a little" or "not much at all." Similarly, although 99% of smokers say they have
19 heard of emphysema, 47% of adult smokers and 74% of teen smokers say they know only
20 "a little" or "not much at all" about the pain and suffering caused by this disease. In fact,
21 only 56% of adult smokers and 27% of teen smokers realize that emphysema is not
22 curable. U.S. Exhibit 17,736 (Weinstein et al., 2004a).

23 The severity of lung cancer is also widely underestimated. In another national

1 survey, only 38% of smokers (and 47% of never smokers) realized that less than one-
2 quarter of lung cancer victims are cured. The remaining respondents thought that a larger
3 proportion is cured. U.S. Exhibit 17,736 (HINTS Survey, 2004). The actual 10-year
4 death rate is over 90%. U.S. Exhibit 17,736 (Ries et al., 2001). Similarly, 81% of teens
5 and 66% of adults believe that lung cancer patients typically live for three years or more.
6 U.S. Exhibit 17,736 (Weinstein & Slovic, 2001). However, the typical lung cancer
7 patient actually dies within a short ten months of diagnosis. U.S. Exhibit 17,736 (SEER,
8 2001).

9 **Q: Do adolescents and adults have similar or different understandings of the nature**
10 **and magnitude of the harm produced by smoking?**

11 A: Research shows that smokers underestimate the severity of lung cancer and emphysema
12 and smokers acknowledge that they know little about what it is like to experience either
13 of these diseases. As the data I just cited show, adolescents are generally similar to adults
14 in their perceptions of the degree of harmfulness of smoking, but they tend to know less
15 about the illnesses that are involved. Adolescents also tend to give lower estimates for
16 the riskiness of smoking in general, than do older people. For example, in one peer-
17 reviewed study, adolescents gave lower ratings for the amount of harm caused by
18 occasional, experimental, and regular smoking than did their parents. U.S. Exhibit
19 17,736 (Cohn et al., 1995).

20 **Q: Overall, what do you conclude regarding people's knowledge of the identity and**
21 **nature of the illnesses caused by smoking?**

22 A: I conclude that people, including smokers, have a seriously deficient understanding of the
23 identity and nature of smoking caused illnesses. Adolescents' lack of knowledge,

1 combined with their underestimation of the seriousness of these illnesses, means that they
2 are likely to start smoking or remain smoking without full recognition of the harms to
3 which they are exposing themselves.

4 **Q: Are you aware of any research that is inconsistent with the conclusion you just
5 stated?**

6 A: As I mentioned earlier, when people are asked in the context of an interview about
7 smoking whether smoking causes particular illnesses, a high proportion agree that
8 smoking causes lung cancer, emphysema, and heart disease. This might appear to show
9 that people have full knowledge of the fact that smoking can, in fact, cause these
10 illnesses, and therefore might be interpreted as suggesting that these people were fully
11 informed about the risks of smoking when they began smoking. This conclusion would
12 be incorrect for two reasons. First, the high proportion of the public now agreeing with
13 such statements took decades of public information campaigns to develop, so current
14 figures overestimate the knowledge that many current smokers had when they actually
15 began to smoke. In earlier years, many more people disagreed with these statements.
16 (Surgeon General's Report, 1989). Second, people may have only a vague recollection of
17 the link between smoking and these illnesses. When a question asks about a particular
18 illness, the question reminds people of the possibility of this illness and they answer
19 affirmatively. However, without this prompt, many are incapable of recalling the link
20 between smoking and the specific illness. Unprompted recall is a more appropriate test
21 of understanding because questions using this technique tell us what information is
22 actually available to people to use when they make decisions.

1 ***B. Factor Two: Likelihood of the Potential Harm***

2 **Q: Please remind the Court of the second factor.**

3 A: It is people's knowledge about the likelihood of experiencing harm from smoking.

4 **Q: How would you assess people's understanding of this issue?**

5 A: Judging the public's beliefs about illness likelihood (with "likelihood" being synonymous
6 for "probability") is challenging. There are many ways of thinking about likelihood that
7 people find helpful in making decisions, so in the survey research I conduct and review,
8 no single question is sufficient to cover this topic. For example, sometimes people think
9 in terms of relative risks, considering which of several different problems is more likely
10 to happen. At other times, they are concerned about another type of relative risk, how
11 their own probability of harm compares to the probability of their peers. People also
12 think in terms of absolute risk: for example, whether the risk is "small" or "large."
13 Scientists often express absolute likelihood in numerical terms, using frequencies, odds,
14 proportions, and similar expressions. However, because much of the public has difficulty
15 both understanding and using these statistics, we should not give too much weight to
16 whether or not lay people can recite the numbers that scientists use.

17 **Q: What survey questions can determine whether smokers have accurate perceptions
18 of the likelihood of harmful effects?**

19 A: In order to examine whether smokers have accurate perceptions of the likelihood of
20 harmful effects, one must determine smokers' understanding of both relative and absolute
21 risks from cigarettes. Examples of relative risk questions are: Do smokers understand
22 how the harm from smoking-induced illness compares to the harm from other familiar
23 hazards, such as automobile fatalities, murder, and AIDS? Do smokers understand how

1 much a smoker's risk of smoking-related illnesses is increased above that of a
2 nonsmoker? Examples of absolute risk questions are: Can smokers correctly state the
3 number of smokers out of 100 who will contract heart disease, lung cancer, or other
4 smoking-related illnesses? Can smokers correctly state the proportion of smokers who
5 will die prematurely because of smoking? Can smokers correctly state the proportion of a
6 specific illness, such as lung cancer, that is caused by smoking? Such diverse questions
7 are useful because they reflect the various types of information about risk likelihood that
8 people use in decision making.

9 **Q: Do smokers understand the relative risks of smoking?**

10 A: No, smokers do not understand the relative risks of smoking. Smokers underestimate the
11 relative harm from smoking-induced illnesses compared to the harm from other hazards.
12 In particular, people greatly underestimate the number of smoking-caused deaths as
13 compared to other familiar hazards such as automobile fatalities, murder, and AIDS.

14 **Q: What is the basis for your conclusion?**

15 A: I rely upon survey research. In a typical study conducted for the American Cancer
16 Society, Americans were asked which of a number of hazards, including cigarette
17 smoking, drug use, AIDS, alcohol abuse, and murder, was responsible for the greatest
18 number of deaths each year. In reality, more deaths are due to cigarette smoking than to
19 *all* of the other listed health problems *combined*. Nevertheless, the largest number of
20 people in the survey, 28%, believed that car accidents kill more people than any other
21 hazard on the list. Only 21%, about one person in five, recognized that cigarette smoking
22 is by far the biggest killer on the list. U.S. Exhibit 17,736 (American Cancer Society,
23 1993, pp. 21-22). Many other studies have reached the same conclusion about the

public's misunderstanding of the relative danger from cigarettes. U.S. Exhibit 17,736 (Borland, 1997; Eiser et al, 1979; Annenberg, 2000; Weinstein & Slovic, 2001).

Q: Do smokers realize how much their risks of smoking-related diseases are elevated above those of nonsmokers?

A: No, smokers underestimate how much a smoker's risk of disease is elevated above that of a nonsmoker's risk. For example, in the HINTS survey, conducted recently by the National Cancer Institute, smokers were asked how much lung cancer risk of an average smoker compares to the risk of a nonsmoker. The mean response was that a smoker has 7 times the nonsmoker's risk. U.S. Exhibit 17,736 (HINTS Survey, 2004). However, the epidemiological data showed that female smokers have 12 times the lung cancer risk of female nonsmokers and male smokers have 22 times the lung cancer risk of male nonsmokers. U.S. Exhibit 63,621 (1989 Report of the Surgeon General, citing American Cancer Society's Cancer Prevention Study II data). In other words, smokers acknowledge that the risk is increased, but they underestimate how much it is increased.

Q: As well as relative risks, what is the other type of likelihood or probability you identified?

A: I identified absolute risks. Absolute risks can be described verbally, using terms such as “large” or “small,” or can be assigned a numerical value.

Q: Do smokers understand the absolute risks of smoking as describe numerically?

A: No. Some studies include questions that ask people to provide numerical estimates of risk, but such questions are of limited use in determining whether people understand risks. Moreover, numerical estimates provided by survey respondents do not correspond well to their real-life actions, whereas estimates such as “small risk” or “large risk”

1 correspond better. In sum, people have little reliable knowledge of smoking risk
2 statistics.

3 **Q: Why are questions that ask people to provide numerical risk estimates of limited
4 use?**

5 A: There are three reasons, all grounded in research. First, lay people have great difficulty in
6 understanding and using numerical estimates of risk. Second, few people have ever
7 thought about the numerical statistics for smoking, and the numbers people provide when
8 suddenly asked a survey question tell us little about their beliefs. Third, the studies that
9 have asked for numerical estimates for smoking risks find no consistent pattern: people
10 overestimate some smoking statistics and underestimate others.

11 **Q: First, please explain what you mean when you testify that lay people have difficulty
12 in understanding and using numerical statistics about risk.**

13 A: As I said, it is well-known and well-documented in the literature. Data collected in the
14 course of cancer risk communication research provide a particularly clear example of the
15 problems members of the public have in understanding frequencies and percentages in a
16 risk context. A peer-reviewed published study asked 463 people, about 90% of whom
17 had at least some college education, extremely simple questions regarding probabilities
18 and percentages, with stunning results. U.S. Exhibit 17,736 (Lipkus et al., 2001).

19 **Q: What did this research find?**

20 A: They found that 19% of the respondents (and 40% of the smokers) were unable to answer
21 the following question correctly: "If the chance of getting a disease is 10%, how many
22 people would be expected to get the disease . . . out of 100?" The correct answer, 10,
23 required only basic math skills and understanding of percentages. Similarly, 30% of

respondents (and 47% of smokers) gave the wrong answer when asked, “If the chance of getting a disease is 20 out of 100, this would be the same as having a _____% chance of getting the disease.” The correct answer, which again required only basic math skills, is that 20 people ill in a total of 100 represents a 20% chance of getting a disease. U.S. Exhibit 17,736 (smokers’ data from Lipkus, 1998)). These are just two of the questions in this study demonstrating that many people lack the basic skills needed to understand numerical information about risks. Other studies reach the same conclusion. U.S. Exhibit 17,736 (Schwartz et al., 1997; Cuite et al., 2004).

Q: What is the significance of the fact that many of the respondents, and many more of the smokers, could not answer these questions correctly?

A: People are easily confused when risk probabilities are expressed in different, although numerically equivalent ways. The data also indicate, more generally, that many people lack the ability to carry out basic numerical operations on probability statistics of the type that would be needed to use such information in real-life situations.

Q: Does other research also support your conclusion?

A: Yes. For example, a peer-reviewed published study introduced a scale to measure differences in “numeracy” (a notion akin to “literacy”) between individuals. They found that 38% of their well-educated sample (62% college graduates) made fundamental, logical errors when giving numerical risk estimates. For example, some gave a higher estimate for the likelihood of contracting breast cancer sometime in the next 10 years than for the likelihood sometime in the next 20 years, while others gave a higher estimate for the likelihood of getting and dying of breast cancer than for the likelihood of getting breast cancer in the first place. This study shows that many people do not understand one

1 of the basic principles of probabilities: the probability that an event will occur in a
2 particular time period (i.e., getting cancer in any of the next 20 years) has to be larger than
3 the probability that the event will occur in just a portion of that time period (i.e., getting
4 cancer in any of the next 10 years). U.S. Exhibit 17,736 (Black et al., 1995).

5 **Q: Does other research also support your conclusion?**

6 A: Yes, other researchers have reported enormous variability in how people interpret the
7 odds associated with small risk probabilities, such as 1 in 1,000. Some people focus on
8 the large denominator and are reassured, whereas others looking at the exact same
9 number focus their attention on the single victim and become more concerned than ever.
10 U.S. Exhibit 17,736 (Lippman-Hand et al., 1979).

11 **Q: Second, can you explain what you mean when you testify that people's estimates of
12 the numerical statistics for smoking tell us little about their beliefs?**

13 A: Research indicates that people's numerical estimates do not reflect clear beliefs about
14 their risk. Moreover, a variety of studies have shown that numerical estimates provided
15 by survey respondents in risk situations do not correspond well to their actions in real-life
16 settings, whereas verbal risk expression, such as "small risk" or "large risk" correspond
17 better to their actions.

18 **Q: What research illustrates that people's numerical estimates do not reflect clear
19 beliefs about their risk?**

20 A: Several different types of data indicate that people have no clear beliefs about many
21 smoking statistics. People will give interviewers a number when asked for one during a
22 survey, but often what they are giving is just a top-of-the-head guess or a number that is
23 meaningless to them.

1 **Q: How do you know that respondents are guessing in response to such questions?**

2 A: Data from studies requiring people to estimate smoking risk statistics often find an
3 unusual number of survey respondents who estimate the risk of lung cancer at 50% or 50
4 out of 100 -- as many as 37% of the respondents. U.S. Exhibit 17,736 (Viscusi, 1990;
5 Sutton, 1995a). Recent research has shown that people often choose 50% as a default
6 answer, because they do not have any better notion of how to answer the question. Many
7 respondents who answer "50%" do not mean that the risk is actually one in two. Rather,
8 they simply intend to indicate that the outcome might or might not happen but they do not
9 know what number to give. U.S. Exhibit 17,736 (Fischhoff & De Bruin, 1999).

10 **Q: Does other research support your conclusion that respondents do not have clear
11 beliefs about risk?**

12 A: Yes. If people do have clear beliefs about a risk (or any topic), they will give the same
13 answer even if the question is slightly altered, assuming that the meaning of the question
14 is the same. If people do not have clear beliefs about risk, the answers they provide will
15 change if the question changes. Research that asks people to estimate the absolute risks
16 of smoking shows that they do not have clear beliefs about the risks of smoking. When
17 survey participants were asked how many smokers out of 100 would die of lung cancer,
18 the average adult answer was 48 and the average youth answer was 60. However, when
19 asked to think about several possible causes of death (lung cancer, auto accidents, heart
20 disease, stroke, and all other causes) and to estimate how many smokers would die from
21 each of them, the estimates for lung cancer dropped to 23 for adults and 28 for youth.
22 The two questions ask for exactly the same numerical risk estimate of lung cancer, but
23 they lead to very different answers. This is because people are so uncertain about the

1 actual degree of risk that their answers are influenced by the form of the question. U.S.
2 Exhibit 17,736 (Slovic, 2001).

3 **Q: Can you provide examples of studies that illustrate the phenomenon where**
4 **numerical estimates do not correspond to real-life actions?**

5 A: Yes. A peer-reviewed published study found no correlation between the numerical
6 probabilities provided to couples during genetic counseling for birth defects and the
7 decisions they then made about child bearing. U.S. Exhibit 17,736 (Shiloh & Saxe,
8 1989). Another peer-reviewed published study reported that participants' judgments of
9 likelihood based on a scale of verbal categories predicted their subsequent action better
10 than did their numerical likelihood estimates. U.S. Exhibit 17,736 (Windschitl & Wells,
11 1996). Similarly, a peer-reviewed published study that I coauthored found that college
12 students felt that scales of risk with verbal labels such as "very unlikely," were easier to
13 use and did a better job of representing their true feelings than did numerical scales based
14 on either odds or percentages. U.S. Exhibit 17,736 (Diefenbach, Weinstein & O'Reilly,
15 1993). For these reasons, the use of scales with verbal choices to assess beliefs, including
16 beliefs about risk, is accepted routinely in the most respected, refereed journals in
17 psychology, health education, public health, medicine, sociology, and opinion polling.

18 **Q: Third, do studies that collect numerical estimates for smoking show a consistent**
19 **pattern in these estimates?**

20 A: No. In Table 1 of my article "Smokers' Recognition of Their Vulnerability to Harm," I
21 set out several examples of such studies that reveal this inconsistency. Examining
22 respondents' numerical risk estimates, some researchers conclude that smokers
23 overestimate risks, but researchers asking people about different smoking statistics

1 conclude that smokers underestimate the risks. U.S. Exhibit 17,736 (Weinstein, 2001).

2 **Q: Can you provide an example of a study that concluded that people underestimate
3 the risks?**

4 A: Certainly. For example, a peer-reviewed published study found that relatively heavy
5 smokers “greatly underestimate” the numerical risk of mortality before age 75. The study
6 concluded, “The evidence to date, especially the results reported here, suggests that
7 smokers underestimate the risks of smoking and do not personalize those risks that they
8 do acknowledge.” U.S. Exhibit 17,736 (Schoenbaum, 1997, p. 758).

9 **Q: Did other studies similarly conclude that people underestimate the risks?**

10 A: Yes. In a survey conducted in England of a representative national sample, the median
11 response was that 100 out of 1,000 smokers would die because of smoking before age 70.
12 According to a peer-reviewed published study, the epidemiological data indicate that the
13 actual number is 250 (not counting 250 more who would die after age 70 from smoking).
14 U.S. Exhibit 17,736 (Sutton, 1996). In a recent national U.S. study, 50% of the sample of
15 adult smokers agreed that “only about 1 out of 10 smokers die because of smoking” or
16 said they did not know, when the actual number is much higher. These data show that at
17 least half of this sample greatly underestimates the risk that smokers will die prematurely
18 or have no idea what the risk is. U.S. Exhibit 17,736 (Cummings et al., 2004).

19 **Q: Do other studies show underestimation of risk when people are asked to give
20 numerical estimates?**

21 A: Yes, as I mentioned earlier, smokers also substantially underestimate the amount by
22 which a smoker’s risk of lung cancer is increased above that of nonsmokers’ risk. U.S.
23 Exhibit 17,736 (HINTS Survey, 2004).

1 **Q: Assessing this situation – one in which studies show diametrically opposite results –**
2 **what do you conclude?**

3 A: It is not surprising that when asked to generate unfamiliar numeric statistics, people
4 overestimate some and underestimate others. Importantly, the wording of questions can
5 dramatically change the answers people give. This finding indicates that people have
6 little reliable knowledge of smoking risk statistics.

7 **Q: Do some interpret these numerical risk estimates differently than yourself?**

8 A: Yes. In a 1991 survey, Dr. Viscusi asked survey respondents, “Among 100 cigarette
9 smokers, how many of them do you think will die from lung cancer, heart disease, throat
10 cancer, and all other illnesses because they smoke?” The mean response by current
11 smokers was 47, which Dr. Viscusi argues shows that smokers overestimate the overall
12 mortality risk.

13 **Q: Do you know whether Dr. Viscusi is an expert witness for Defendants in this case?**

14 A: That is my understanding.

15 **Q: Do you agree with Dr. Viscusi’s reliance on and interpretation of these numerical
16 risk estimates?**

17 A: No. For all the reasons I have given above, I do not think that the results Dr. Viscusi
18 reports demonstrate that people overestimate the risks of smoking. Rather, research
19 shows that smokers do not have a clear understanding of the risks and that their numerical
20 risk estimates will change if a question is phrased differently. For example, in the
21 research I have cited above, Cummings et al. asked a nationally representative sample of
22 smokers to agree or disagree with the statement, “only one out of 10 smokers die because
23 of smoking.” This statement, of course, refers to a 10% mortality risk from smoking.

1 Half of the Cummings et al. respondents either agreed with this statement or said that
2 they did not know. Thus, Viscusi's approach suggests a mean perceived mortality risk of
3 47%, with an unknown number of respondents underestimating the risk. The approach of
4 Cummings et al. suggests a median perceived mortality risk of about 10%, which greatly
5 underestimates the probability of harm. U.S. Exhibit 17,736 (Cummings et al., 2004).

6 **Q: How do you interpret Cummings' different result?**

7 A: Dramatic changes in estimates of risk statistics which are a function of the ways that
8 questions are phrased, prove that people do not have reliable or well-thought-out beliefs
9 about the numerical risks from smoking.

10 **Q: Has Dr. Viscusi relied upon questions other than those that ask people for
numerical estimates to determine whether people understand the risks of smoking?**

11 A: No. Dr. Viscusi's work that I am aware of has been limited to an examination of the
12 numbers people give when asked for their estimates of epidemiological statistics (i.e., risk
13 numbers). The central premise of his work is that asking smokers about epidemiological
14 statistics is the correct way to measure their perception of a risk. In fact, he asserts that
15 asking people to generate these numerical statistics is both necessary and sufficient to
16 form conclusions concerning whether people understand smoking risks.

17 **Q: And what conclusion does Dr. Viscusi draw based upon these numerical statistics?**

18 A: Based on the particular approach he has chosen, Dr. Viscusi has argued that smokers
19 overestimate the risks of smoking, an opinion based substantially on the surveys
20 discussed in his published articles and book. U.S. Exhibit 17,736 (Viscusi, 1990; 1991;
21 1992; 1998a; 1998b).

22 **Q: Is Dr. Viscusi's approach – relying solely upon numerical risk estimates – a reliable**

way to investigate people's understanding of the risks of smoking?

A: No.

Q: Why?

A: Dr. Viscusi's approach has at least four major problems.

Q: What is the first problem?

A: First, his decision to look only at smokers' numerical risk estimates falsely assumes that asking people to estimate epidemiological statistics is sufficient to learn whether they understand the health risks of smoking.

Q: Why is it problematic to ask people to give numerical estimates of epidemiological statistics?

A: As I explained earlier, because individuals seldom make decisions on the basis of numerical risk statistics, they find it very difficult to make such judgments and find it difficult to understand such statistics when provided to them. As a result, the numbers that people give in answers to questions about risk are often highly unreliable. A numerical risk estimate is, at best, only one of a number of types of data that can be collected to reach an accurate conclusion about someone's understanding of the risks from smoking.

Q: Are there other reasons why asking smokers to provide numerical estimates is problematic?

A: Other issues are illustrated in Dr. Viscusi's book in which he presents responses to the question, "Among 100 cigarette smokers, how many of them do you think will get lung cancer because they smoke?" Table 6-3 in that book contains a graph that shows a large spike at the middle of the distribution of the data upon which Dr. Viscusi relies. He

interprets these as people who genuinely believe that 50 out of 100 smokers develop lung cancer. However, the presence of that anomalous spike in the center of the data suggests that these are not valid responses. Rather, as I have explained, it is well established that many respondents give 50% as a default answer, because they do not have any clear idea how to answer. They were simply saying “50” as an alternative to saying “I have no idea.” Thus, an unknown proportion of the people who give this answer should not be included in the calculations that Dr. Viscusi performs to derive an average risk estimate. Moreover, some respondents claimed that 100 out of 100 people would die from smoking, a clearly invalid answer unless they believe that there is no other cause of death in the world other than smoking. U.S. Exhibit 17,736 (Viscusi, 1992).

Q: What is the second problem?

A: Second, his narrow view of what constitutes “understanding” of risk simply ignores a great many issues that are essential for understanding risks and essential to making decisions about risks. His definition of understanding omits nearly all of the important factors I outlined earlier in my testimony. He overlooks whether people know what illnesses are caused by smoking and what it is like to experience these illnesses; whether perceptions of relative probability (that is, smoking risks compared to other risks and smokers’ risks compared to nonsmokers’ risks) are correct; and whether people fully understand addiction and the difficulties of quitting. His definition also ignores the tendency of smokers to believe that the risks faced by other smokers do not apply to them. Thus, he *assumes* that smokers and prospective smokers have adequate understanding of all these issues and he makes no attempt to examine existing data to determine whether this assumption is valid.

1 **Q: What is the third problem?**

2 A: One major methodologic flaw in Dr. Viscusi's work, and in other surveys that only ask
3 survey respondents about the risk from smoking for "smokers in general" or for the
4 "average smoker," is that those surveys do not take optimism bias into account.

5 **Q: What is optimism bias?**

6 A: "Optimism bias" refers to the strong tendency of people to believe that their own risk is
7 less than the risk of their peers. In other words, whatever people may accept about the
8 risks faced by the "average smoker" or by "smokers in general," they tend to believe that
9 they have a lower risk. It is important to take optimism bias into account when asking
10 survey questions because decisions and actions reflect our beliefs about ourselves more
11 than they reflect our beliefs about some abstract smoker with whom we tend not to
12 identify.

13 **Q: Does optimism bias operate for smokers?**

14 A: Yes. Consequently, in assessing whether smokers make rational choices in deciding to
15 start or continue smoking, questions must inquire about the degree of risk that the
16 smokers believe they are themselves incurring. Research on optimism bias shows that
17 people asked about themselves often conjure up rationalizations that lower than perceived
18 risk. For example, smokers are likely to claim that the cigarettes they smoke are less
19 harmful, that they will eventually stop, or that others smoke more often or inhale more.

20 **Q: Does Dr. Viscusi account for optimism bias in the survey he relies upon or
21 conducts?**

22 A: No. All of Dr. Viscusi's risk questions ask about risks for smokers in general, not about
23 risks for the individual being questioned. By asking only about the risks to smokers "in

1 general" Dr. Viscusi's studies overstate what people believe about the size of their own
2 risk. U.S. Exhibit 17,736 (Viscusi, 1990; 1992; 1998a; 1998b).

3 **Q: What is the fourth problem?**

4 A: It is a basic, fundamental problem with the methodology of Dr. Viscusi's surveys. Dr.
5 Viscusi does not define the word "smoker" in his survey questions.

6 **Q: Why is that a problem?**

7 A: Failure to provide a definition for the term "smoker" allows survey respondents to define
8 the term for themselves, introducing another potential bias in the results. In response to
9 his questions, most people will bring to mind a prototypical smoker, one who smokes a
10 lot, which will inflate their estimates. What people would say if they were reminded to
11 consider all smokers, from those who smoke only occasionally to those who smoke very
12 heavily, would probably be lower.

13 **Q: In reaching your conclusion about people's perception of the risks of smoking, did
14 you consider Dr. Viscusi's published work?**

15 A: Yes, I did.

16 **Q: Did it cause you to change your conclusions?**

17 A: No, it did not. For the reasons I have stated, Dr. Viscusi's opinion that smokers greatly
18 overestimate the risks of smoking is flawed and based upon methodologically
19 problematic research.

20 **Q: Dr. Weinstein, have you had an opportunity to review the opening statements made
21 by the various counsel for Defendants in this case on September 22?**

22 A: Yes, I have reviewed parts of it.

23 **Q: Do you recall any portion that was related to your testimony?**

1 A: Yes. In his statement, counsel for Brown & Williamson stated, at 271:4-272:8, that:

2 Essentially, what happened in 1964 is the government said:
3 Cigarette smoking cause[s] disease. The industry said, as you've
4 heard, Not proven. And what did the consumer do? The consumer
5 voted with his or her feet. They quit. They quit in the tens of
6 millions of people. Why? Well to a certain extent the information
7 was already there. There was nothing new in the sense of these
8 people because, as was indicated by the American Medical
9 Association even before the warnings came out, everybody has
10 known about this problem for the last 10 years. But the warnings
11 did come out. In 1968, after the warnings came out, Dr. Horn, who
12 was a significant smoking and health authority, says you can stand
13 on a rooftop and shout smoking is dangerous at the top of your
14 lungs and you would not be telling anybody anything they did not
15 already know. . . . A whole series of polls show that as time goes
16 on astronomically high rates of recognition and acknowledgment,
17 even by kids, that smoking [is] harmful to health. This is 1968.
18 This is 1971. This is a whole series of them from '77 to '90. Kids
19 actually, adults actually overperceived the risks of smoking. You
20 will hear evidence that people think that smoking is more
21 dangerous than in fact it is. All this was recognized by the Surgeon
22 General in 1989. The Surgeon General basically went back over
23 this whole period of time and said, There's been a massive
24 antismoking campaign and it's been awesomely tremendously
25 successful.

26 **Q: Have you considered the sources that counsel for Brown & Williamson refers to?**

27 A: Yes, I considered the Surgeon Generals' Reports of 1964 and 1989, as well as the poll
28 results from 1968 and 1971 to 1990, and a more extensive series of polls conducted by
29 the Gallup Corporation from 1954 to 1999.

30 **Q: Do you agree with Defendants' counsel's statement that, in 1968, "even before the
31 warnings came out, everybody has known about this problem for the last 10 years"?**

32 A: No. There is a huge difference between "know[ing] about this problem" and believing
33 (i.e., being convinced) that it really is a problem. The data clearly show that many people
34 in the 1960's either did not believe smoking was a significant risk or knew so little about

1 that risk that the words "problem" or "harmful" were essentially empty labels. And of
2 course, tobacco companies at this time were vehemently denying that smoking was a
3 problem.

4 Equally important, it is a large, additional step to go from believing that smoking
5 is a problem for somebody to believing that it is a problem for oneself, and the latter is
6 what counts in individual smoking decisions. As I have testified, a vague belief that
7 something can be dangerous is not sufficient for people to make informed decisions about
8 exposing themselves to this danger.

9 **Q: Is Defendants' counsel's assertion accurate that, in 1968, you could have stood "on a**
10 **rooftop and shout smoking is dangerous at the top of your lungs and you would not**
11 **be telling anybody anything they did not already know"?**

12 A: No.

13 Q: Why not?

14 A: The evidence shows that it has taken decades to get to the present point, where a large
15 majority of the population now believes that smoking increases the risk of life-threatening
16 illnesses. In the 1970 Gallup poll (July 24-29), for example, 30% of respondents did not
17 agree that cigarette smoking is one of the causes of lung cancer and 40% of smokers did
18 not agree that smoking is one of the causes of heart disease. In the 1975 Adult Use of
19 Tobacco Survey, 19% of current smokers did not even believe that cigarette smoking is
20 harmful to health. (Surgeon General's Report, 1989). In a 1981 Gallup Poll, 31% of
21 current smokers still did not believe that cigarette smoking causes lung cancer. (Surgeon
22 General's Report, 1989). In 1987, another nine years later, 31% of current cigarette
23 smokers in the National Health Interview Survey still did not believe that cigarette

smoking was related to emphysema. These data clearly contradict Defendants' counsel's assertion that the public was fully cognizant of smoking risks by 1968. U.S. Exhibit 17,736 (Giovino et al., 1996, p. 50).

Even today, most people do not realize how dangerous smoking is and many think that the risk has been exaggerated. As cited earlier, in a 1999-2000 survey, 35% of teen smokers and 40% of adult smokers said that they thought the harmful effects of cigarettes had been exaggerated. U.S. Exhibit 17,736 (Annenberg, 2000). In another recent survey, 40% did not accept the idea that smoking is “very dangerous.” U.S. Exhibit 17,736 (McMillen et al., 2000).

Q: Is Defendants' counsel's assertion that "Kids actually, adults actually overperceived the risks of smoking" accurate?

A. No

Ω: Why not?

A: As I hope my testimony has made clear, being sufficiently informed about the risks of smoking to make effective decisions requires knowledge about several aspects of smoking. For nearly every one of these aspects, research shows that people have either very incomplete understanding or substantially underestimate the danger. Out of all the many aspects of smoking risks relevant to making good decisions, Defendants' counsel ignores all the evidence except the epidemiological statistics such as those discussed by Dr. Viscusi. There are many problems with both the approach and the methodology employed by Dr. Viscusi, as I have set out earlier in this testimony. To briefly summarize, the numerical statistics counsel is apparently referring to – one concerning lung cancer incidence, one concerning mortality from various smoking-related diseases,

1 and one concerning years of life lost by smokers – are three that lay people seem to
2 overestimate. However, there are at least as many statistics – for example, how much
3 smoking increases the risk of lung cancer above that of nonsmokers; what percentage of
4 people die prematurely due to smoking, and others – that people underestimate. If
5 smokers overestimate three arbitrarily-selected smoking statistics and underestimate
6 nearly everything else of importance – the severity of smoking-related illnesses, their own
7 personal vulnerability to harm, the power of addiction – this is not “understanding” by
8 any reasonable definition.

9 Furthermore, as I have explained, because people rarely use numerical probability
10 figures in everyday life, the numbers they produce in response to such survey questions
11 do not reflect their feelings well or predict their behavior well. Consequently, how well
12 respondents can replicate numerical smoking statistics – the evidence counsel for Brown
13 & Williamson is referring to – is among the least meaningful of the issues that need to be
14 considered in determining whether respondents understand the risks of smoking. Finally,
15 there are several flaws in the ways that Dr. Viscusi’s questions were worded—all of which
16 tend to inflate the numbers people give – that make the answers misleading as evidence of
17 what people think their own risk would be if they smoked or what their own risk is from
18 their current smoking.

19 **Q: Returning to your conclusion on factor two of your analysis, what do you conclude
20 about public knowledge of the absolute risks of smoking?**

21 A: A large proportion of the public has enormous difficulty using odds, percentages, and
22 other numerical statistics. The ability to cite a statistic or make a numerical estimate in
23 response to a question does not mean that people understand what the number really

1 means, that they use it in making decisions, or that they think it applies to them. This
2 conclusion applies, specifically, to numerical estimates of smoking risks, so collecting
3 such estimates is not a valid way to assess the accuracy of smoking risk perceptions.

4 **C. Factor Three: Personal Probability and Personal Risk Factors**

5 **Q: Please remind the Court of the third factor.**

6 A: In the context of smoking, this third factor is: what do smokers believe about their own
7 personal vulnerability to the harms of smoking, taking into account factors that may make
8 them think their vulnerability is different from that of other smokers.

9 **Q: How is this third factor different from the two you have already discussed,
10 knowledge about the nature of the harm and the likelihood of harm?**

11 A: Because people show an optimism bias for nearly all hazards, believing that their risks are
12 less than the risks of others, it is not sufficient to ask them only about the risk for smokers
13 in general. It is essential to examine smokers' beliefs about their own risk.

14 **Q: How do you assess smokers' beliefs about their own risk?**

15 A: There are two related topics to be examined. First, we need to investigate whether people
16 think that their pattern of smoking is different from others' smoking. In particular, we
17 should determine whether they believe that there are ways of smoking, certain periods in
18 their lives to smoke, or other considerations that can render them exempt from smoking
19 risks. The second need is to determine what smokers conclude about their own risk and,
20 in particular, whether they think that their personal risk is different from that of other
21 smokers.

22 **Q: What have you concluded about the first of these two issues?**

23 A: Many people believe that there are safe ways to smoke. Furthermore, most smokers

1 believe that their own smoking pattern is less risky than that of other smokers.

2 **Q: What is the basis for your conclusion?**

3 A: Research shows that smokers and nonsmokers hold a variety of highly questionable
4 beliefs about types of smoking. In my recent survey with Dr. Slovic, we studied
5 respondents' agreement with 9 comforting beliefs about smoking. We found that, all
6 together, 63% of teen smokers and 61% of adult smokers agreed with at least one of the 9
7 comforting beliefs we studied. These beliefs are all ones likely to encourage
8 experimentation with smoking and continuation of smoking.

9 **Q: Can you provide examples of how many smokers held these comforting beliefs?**

10 A: Yes. We found that 16% of smokers agreed that smoking is safe if you don't inhale; 20%
11 said smoking is safe if you only smoke one or two cigarettes a day; 10% believed that
12 there is not much risk in smoking in your teens because you have plenty of time to quit;
13 and 17% said smoking is safe if you only smoke during high school or college and then
14 quit. U.S. Exhibit 17,736 (Weinstein & Slovic, 2001).

15 **Q: What were the responses to other questions about these comforting beliefs?**

16 A: Even larger numbers of smokers agreed with two other dangerous myths. Twenty-seven
17 percent agreed that if you exercise regularly, you can undo most of the negative effects of
18 smoking. Furthermore, despite evidence that smokers of so-called "light" or "ultralight"
19 cigarettes compensate by inhaling more deeply and smoking more of each cigarette, and
20 therefore get little or no health benefits from choosing these cigarettes, 23% of the
21 smokers we surveyed still believed that smoking light cigarettes lowers the risk of health
22 problems. U.S. Exhibit 17,736 (Benowitz, 2001; Weinstein & Slovic, 2001).

23 **Q: You have mentioned six of the comforting beliefs you studied. Can you name the**

1 **rest?**

2 A: Yes. A small number of smokers agreed with each of these three statements: “It is safe if
3 you only smoke with friends;” “ If no one in your family has had cancer, smoking
4 cigarettes isn’t likely to give you cancer;” and “ If you smoke regularly for 10 years and
5 still have no cough or shortness of breath, then you’re not likely to have problems in the
6 future.” U.S. Exhibit 17,736 (Weinstein & Slovic, 2001).

7 **Q: Do non-smokers also hold these “comforting” beliefs?**

8 A: Our survey found that they did, but to a lesser extent: 26% of teenage non-smokers and
9 41% of adult non-smokers agreed with at least one.

10 **Q: Do any other surveys report similar results?**

11 A: Yes. The 2002 National Cancer Institute HINTS survey found: 52% of current smokers
12 believed that exercise can undo most effects of smoking; 28% of smokers believed that
13 vitamins can undo most smoking effects; 13% of smokers believed that there is no risk of
14 cancer from smoking a few years; and 36% believed that lung cancer depends more on
15 genes than anything else. U.S. Exhibit 17,736 (HINTS Survey, 2004). This research
16 shows that a majority of smokers believe that it is possible to smoke without incurring
17 any appreciable risk.

18 **Q: Do smokers see their own risk as being equal to the risk of the “average smoker”?**

19 A: No. Smokers see many differences between themselves and the “average smoker,” and
20 whenever they see differences, they always tend to think that they are better off. Research
21 has shown that, on average, smokers claim that they: smoke fewer cigarettes than the
22 typical smoker, inhale less than the typical smoker, are less addicted than the typical
23 smoker, are better able to quit than the typical smoker, have a healthier lifestyle than the

1 typical smoker, are less influenced by cigarette advertising than the typical smoker, and
2 smoke cigarettes that are lower in tar and nicotine than the typical smoker. U.S. Exhibit
3 17,736 (HINTS Survey, 2004; Annenberg, 2000; Segerstrom et al., 1993; Weinstein &
4 Slovic, 2001); Surgeon General's Report, 1989 pp. 181, 204 (U.S. Exhibit 63,621).

5 **Q: Does your research show that smokers perceive that it is safer to smoke "light"
6 cigarettes than regular cigarettes?**

7 A: Yes. The survey I conducted with Dr. Slovic included a question on this topic. We found
8 that a substantial portion of smokers believe that low-tar cigarettes are less risky than
9 regular cigarettes. Specifically, thirty percent of teen smokers and 17% of adult smokers
10 thought that light cigarettes are safer. U.S. Exhibit 17,736 (Weinstein & Slovic, 2001).

11 **Q: Have other surveys also found that smokers perceive "light" cigarettes to be less
12 harmful?**

13 A: Yes, many studies have looked at this particular question, and depending on question
14 wording, varying numbers of smokers agree that smoking light cigarettes is less harmful
15 or less addicting. Considering all the studies, the median result is that about 40% of
16 respondents think it is safer to smoke light cigarettes. By "median," I mean that half of
17 the studies report a higher number and half report a lower number. For example, the
18 1987 National Health Interview Survey showed that 45.7% of ultralight smokers believed
19 that low tar cigarettes reduce the risk of cancer; 32.2% of light smokers believed the same
20 thing; and 29.4% of regular smokers believed the same thing. U.S. Exhibit 17,736
21 (Giovino et al., 1996). Similarly, another national, peer-reviewed published study found
22 that 67% of smokers agreed that high tar cigarettes are at least twice as likely to cause
23 illness as ones that are low in tar or did not know if this statement was correct or not.

1 There are many other studies with similar conclusions. U.S. Exhibit 17,736 (Cummings
2 et al., 2004).

3 **Q: In these other surveys, do smokers indicate that they smoke light cigarettes for the
4 perceived reduction in risk?**

5 A: Yes, that is one of the key reasons. A large proportion of smokers of low-tar cigarettes
6 agree that health considerations influence their choice of cigarettes. Across many
7 surveys, a median of about 61% of current smokers agree that reducing their health risks
8 is one of the reasons why they have chosen light cigarettes.

9 Other surveys phrase this question somewhat differently, asking whether people
10 smoke light cigarettes to reduce their health risks *without having to quit smoking*. The
11 median result across studies on this form of the question is that about 44% agree.

12 Sometimes surveys ask people whether they have switched to light cigarettes as a
13 step toward quitting smoking entirely. The median result is that about 42% of those who
14 have switched agree with this statement.

15 Taken together, these various questions show unequivocally that roughly half of
16 all light and ultralight cigarette smokers say they have chosen these cigarettes as a
17 healthier choice or because switching to reduced tar cigarettes will help them to quit
18 completely.

19 **Q: Can you provide the relevant findings of some of the studies you mention above?**

20 A: Yes. A 1987 National Health Interview Survey found that 44% of current smokers said
21 that they had at some time switched to a low tar cigarette to reduce health risk. U.S.
22 Exhibit 17,736 (Giovino et al., 1996).

23 Another national survey found that about 60% of ultralight smokers and 40% of

1 light smokers said they smoke low tar cigarettes to reduce the risks of smoking without
2 having to quit. Specifically, when asked why they chose to smoke ultralight/light
3 cigarettes, respondents agreed with the following reasons: step toward quitting (49% of
4 ultralight cigarette smokers/30% of light cigarette smokers); reduce risk without having to
5 quit (58% of ultralight cigarette smokers/39% of light cigarette smokers); taste (69% of
6 ultralight cigarette smokers/80% of light cigarette smokers). U.S. Exhibit 17,736
7 (Kozlowski, Goldberg et al., 1998).

8 In an experiment involving a random sample of 568 smokers of light cigarettes,
9 those in the control condition gave the following reason for smoking light cigarettes: step
10 toward quitting (25%); reduce risk (43%); reduce tar or nicotine (70%); prefer taste
11 (81%). Thirty-nine percent said that light cigarettes decreased their risk of having health
12 problems. U.S. Exhibit 17,736 (Kozlowski et al., 1999).

13 In the 1993 Teenage Attitudes and Practices Survey, smokers of light or ultralight
14 cigarettes said they chose those brands because of: taste (33%); less irritating (29%);
15 healthier (21%); just liked them (19%). U.S. Exhibit 17,736 (Giovino et al., 1996).

16 A national survey of adults conducted by the CDC in 1986 showed that those who
17 have switched in order to reduce tar or nicotine are more likely than those who have not
18 switched to believe that some brands are more hazardous than others (54% v. 40%) and
19 that their brand is less hazardous than other brands (33% v. 16%). U.S. Exhibit 17,736
20 (Giovino et al., 1996).

21 **Q: Have studies examined smokers' knowledge about the composition or construction
22 of low tar cigarettes?**

23 A: Yes. Most smokers believe that light and ultralight cigarettes have less tar: the median

1 result was about 66%. As a consequence, few realize that smoking a light cigarette yields
2 about the same amount of tar as a regular cigarette, with the median number answering
3 that question correctly being 19%. Furthermore, smokers have very little knowledge
4 about the tar levels of the brands they smoke, or about the existence of vent holes.

5 **Q: Can you provide the relevant findings of specific studies?**

6 A: Yes. For example, a peer-reviewed published study reported that 70% of light cigarette
7 smokers said that light cigarettes decrease one's daily tar intake. U.S. Exhibit 17,736
8 (Kozlowski et al., 1999). In another peer-reviewed published study, only 3% of
9 respondents could correctly state (within 2 mg.) the amount of tar in the cigarettes they
10 smoked. Few knew where to look to find tar information, with some 67% saying that
11 they would look on the cigarette package. U.S. Exhibit 17,736 (Kozlowski, Pilletterri et
12 al., 1998). When smokers were asked how many light cigarettes would have to be smoked
13 to get the same amount of tar as from one regular cigarette, the most common response,
14 from about half the respondents, was "don't know." Less than 10% said one cigarette.
15 U.S. Exhibit 17,736 (Kozlowski, Goldberg, et al., 1998).

16 **Q: Do these results show that smokers have an accurate understanding of light
17 cigarettes?**

18 A: No, these results show that smokers misperceive light cigarettes as providing less tar.
19 Fewer than one in ten smokers knew that light cigarettes can and often do deliver as much
20 tar to smokers as regular cigarettes.

21 **Q: Do smokers of regular, light, or ultralight cigarettes have different beliefs about
22 light cigarettes?**

23 A: Research shows there are significant differences. For example, ultralight smokers are

1 somewhat more accurate about the tar numbers, with 13% of ultralight smokers accurate;
2 2% of light smokers accurate; and 1% of regular smokers accurate. U.S. Exhibit 17,736
3 (Kozlowski, Pillette et al., 1998). Research also shows that ultralight smokers are
4 much more likely to claim to use tar numbers in making judgments about cigarette safety.
5 Overall, only 14% of the overall sample said they used tar numbers to make such
6 judgments. However, among smokers of ultralight (1-5 mg) cigarettes, 56% said that
7 they determined safety from advertised tar values. Finally, ultralight smokers perceive a
8 much bigger difference between the risk of regular and light cigarettes than do other
9 smokers. Eighty-three percent of ultralight cigarette smokers said that switching from a
10 20mg to a 5mg cigarette would significantly reduce health risks. This percentage
11 compares to about 50% of other smokers who shared this belief. U.S. Exhibit 17,736
12 (Cohen, 1996a).

13 **Q: Are smokers of light and ultralight cigarettes more concerned about the risks of**
14 **smoking than smokers of regular cigarettes?**

15 A: Yes. Research shows this clearly. In a 1986 Centers for Disease Control study, 85% of
16 those who switched to a light or ultralight cigarette were concerned about effects of
17 smoking, while only 70% of those who did not switch were concerned. Moreover, this
18 study also reported that those who switched to a light or ultralight cigarette were more
19 likely to say that their health had been affected by smoking and that a doctor had advised
20 them to quit. U.S. Exhibit 17,736 (Giovino et al., 1996, pp. 48, 50)

21 **Q: Are quitting attempts or the desire to quit related to the type of cigarette smoked?**

22 A: Yes. As well as reporting a greater concern about health effects, the 1987 NHIS survey
23 showed that smokers of light or ultralight cigarettes have tried more quitting strategies

1 than regular cigarette smokers. U.S. Exhibit 17,736 (Giovino et al., 1996, Table 2).

2 According to the 1986 national Adult Use of Tobacco Survey, among smokers who had
3 never attempted to quit, low tar smokers were more likely to say that they had considered
4 quitting. U.S. Exhibit 17,736 (Giovino et al., 1996, p. 51). A peer-reviewed published
5 study of United States Air Force trainees showed that those who switched to light or
6 ultralight cigarettes to reduce their health risk were more likely to have had a successful
7 24 hour quit attempt in the past, had more healthy diets, and were less likely to take other
8 risks. U.S. Exhibit 17,736 (Haddock, 1999).

9 **Q: Does any research show that switching to light cigarettes actually increases the
10 likelihood of quitting?**

11 A: No. There are no data showing that switching to reduced tar cigarettes increases the
12 likelihood of quitting. In fact, some data show the opposite. A large 1986 national study
13 of adults in the United States who had ever smoked showed that people who had switched
14 cigarette types (from regular to light or ultralight) were significantly less likely to have
15 quit than those who had never switched. The quit rate was 37.0% among those who had
16 switched compared to 50.5% among those who had not switched. U.S. Exhibit 17,736
17 (Giovino et al., 1996).

18 **Q: Based upon the research you have testified about, what do you conclude about
19 smokers' perception of the risks of smoking light cigarettes?**

20 A: A large portion of smokers believe that light and ultralight cigarettes give them less tar
21 and are safer than are regular cigarettes. Roughly half of the people who smoke such
22 cigarettes say they have chosen them for these reasons or as a step toward quitting.
23 Nevertheless, their quitting rates are no higher, and are perhaps lower, than the quitting

rates of people who smoke regular cigarettes. All together, the evidence indicates that many of those who smoke reduced tar cigarettes mistakenly believe that their cigarette choice reduces their risks when it does not. The smoking of so-called “light” and “ultralight” cigarettes is a particularly clear example of people who try to make a choice that reflects their values and concerns, but fail because the information available to them about the risks of that choice has been misleading.

Q: You identified two components in examining personal vulnerability to harm – the first being the reasons that smokers believe their smoking is different from others'. Please remind the Court of the second component.

A: The second component refers to whether smokers think that their personal risk of harmful effects is different from that of other smokers.

Q: What have you concluded about this question?

A: Research shows that, although many smokers agree that they incur some risk from smoking, they consistently underestimate that risk, both when they compare their own risk to that of the “average” person and when they compare their risk to that of the “average” smoker.

Q: Can you provide some examples of the research that so finds?

A: Yes. Several studies have asked smokers how their own risk of becoming ill from smoking compares to the risk of the average person or the average person their age. Respondents are usually given a choice of verbal response categories (such as, “no different,” or “much greater than average”) to answer such questions, so the responses are likely to be more meaningful than when people are asked to estimate numerical smoking statistics. One such peer-reviewed published study based on a nationally representative

1 1995 sample found that only 29% of smokers said that their personal risk of heart attacks
2 is higher than the average for people of their age and sex, and only 40% of smokers said
3 that their personal cancer risk was higher than the average for people of their age and sex.
4 Even among those smoking two or more packs of cigarettes a day, only 39% said that
5 their heart disease risk was above average and only 49% said that their cancer risk was
6 above average. U.S. Exhibit 17,736 (Ayanian & Cleary, 1999).

7 **Q: Are smokers' estimates of their risk of disease accurate?**

8 A: No. Although many smokers estimate their disease risk as average or below average, the
9 epidemiological data show that smokers' risk of getting these diseases relative to
10 nonsmokers is: for lung cancer, 12 times greater for female smokers, 22 times greater for
11 male smokers; for COPD (emphysema and chronic bronchitis), 10 times greater for
12 female smokers, 10 times greater for male smokers; for heart disease: (1) for people age
13 35 and below, 1.8 times greater for female smokers, 1.9 times greater for male smokers;
14 (2) for people age 36 and over, 3 times greater for female smokers, 2.8 times greater for
15 male smokers. U.S. Exhibit 63,621 (1989 Report of the Surgeon General, citing
16 American Cancer Society's Cancer Prevention Study II data at 153).

17 Since smoking greatly increases the risk of heart disease and cancer, the large
18 majority of smokers do have risks of these illnesses that are clearly above the population
19 average.

20 **Q: Does other research show that smokers underestimate their risks when compared to
21 the "average person"?**

22 A: Yes. In other studies, the mean answers of smokers comparing themselves to the average
23 person ranged from "average" (i.e., smokers claimed that their own risk was no different

1 than that of the average person) to “a bit higher.” In none of these studies did the average
2 smoker acknowledge that his or her risk of lung cancer, heart disease, or emphysema was
3 “moderately,” “substantially” or “much” higher than that of the average person. U.S.
4 Exhibit 17,736 (Milam et al., 2000; Reppucci et al., 1991; Strecher et al., 1995; Sutton,
5 1995a).

6 Other studies show the same failure of smokers to recognize how much their
7 cigarettes increase their risk of serious illness above the risk of nonsmokers. U.S. Exhibit
8 17,736 (Hahn et al., 1998; Slovic, 2001; Weinstein & Slovic, 2001).

9 **Q: Do any studies use numerical questions to measure smokers’ perceptions of their
10 own risk?**

11 A: Yes. In 2002, the National Cancer Institute HINTS survey asked smokers to compare
12 their risk of lung cancer to that of nonsmokers and gave respondents a set of numerical
13 choices to indicate their beliefs about their relative risk.

14 **Q: What did it find?**

15 A: The mean relative risk rating was 5.5. In other words, on average, smokers said that their
16 lung cancer risk was 5.5 times that of nonsmokers. However, depending upon the
17 amount that the respondents smoked, the actual relative risk ranged from 9 times the
18 nonsmoker’s risk (for people smoking 1-10 cigarettes per day) to 22 times the
19 nonsmoker’s risk (for people smoking 40 or more cigarettes per day).

20 Furthermore, 55% of smokers claimed that their risk of lung cancer was no greater
21 than twice the risk of nonsmokers, a gross underestimate.

22 Smokers’ estimates of their relative risk were completely independent of how
23 much they smoked, which demonstrates both the inaccuracy of personal risk perceptions

1 and the difficulties people have in giving numerical estimates of smoking statistics.
2 Those smoking two or more packs of cigarettes a day rated their own relative risk no
3 higher than did respondents smoking 1-10 cigarettes a day. U.S. Exhibit 17,736 (HINTS
4 Survey, 2004).

5 **Q: Have any of these studies evaluating personal risk focused on adolescents?**

6 A: Yes. As an example, Reppucci and colleagues conducted two surveys. The first involved
7 a group of 359 high school sophomores, of average age 15.2 years. These students were
8 asked “to rate the likelihood of their getting lung cancer . . . themselves in the future as
9 compared to the likelihood of other students in their school of the same age and sex
10 getting the disease.” In the second survey, a different group of 322 students, with an
11 average age of 15.7 years, was asked not only about lung cancer but also about two other
12 smoking-related illnesses, emphysema and heart attacks. According to the study, the
13 differences in perception between adolescent smokers and adolescent nonsmokers were
14 striking:

15 Realistically, nonsmokers rated their chances of developing lung
16 cancer as being below average. . . . [S]mokers rated their chances
17 of developing lung cancer as higher than nonsmokers, [but] they
18 still viewed their own chances of developing the disease as
19 average, a clearly unrealistic expectation. Similar results were
20 found for emphysema and heart disease in [the second study].

21 U.S. Exhibit 17,736 (Reppucci et al., 1991).

22 **Q: Is there other relevant research?**

23 A: Yes. Many studies have demonstrated that smokers believe that they face lower risks
24 than the typical or average smoker. U.S. Exhibit 17,736 (Boney-McCoy et al., 1992;
25 Hansen & Malotte, 1986; Lee, 1989; HINTS Survey, 2004; McKenna, Warburton &
26 Winwood, 1993).

Q: What do you conclude from these studies?

A: For smokers including adolescent smokers to consider that their risk is hardly different from “average” shows a serious underestimation of the magnitude of the risk. As the data reported by the Surgeon General demonstrate, the risks of lung cancer, heart disease, and emphysema are much higher among smokers than nonsmokers.

Q: What accounts for this underestimation of risk?

A: I believe that at least three factors contribute. First, information about the magnitude by which smoking increases risks is not readily available to nonprofessionals. Second, there has been decades-long denial of smoking risks by tobacco companies, and they have portrayed smokers in advertisements as robust, attractive, confident people. Third, acknowledging susceptibility to serious harm would make smokers feel anxious, so they prefer to believe that their own risk is low.

Q: Do all studies consistently show optimism bias, where a smoker tends to believe that he or she is at less risk than the average smoker?

A: No. A few do not. U.S. Exhibit 17,736 (Annenberg, 2000; Sutton, 1995b; Weinstein & Slovic, 2001).

Q: How do you explain those studies that do not show optimism bias?

A: Because people prefer not to make assertions that they are better off than others if a survey is not private, as in a telephone or face-to-face survey, some private surveys have not shown optimism bias

Q: Has any national telephone survey found optimism bias?

A: Yes, the most recent and rigorous test of this issue is the NCI HINTS survey, which confirmed that smokers do, indeed, think that their own risk is lower than that of other

1 smokers. In this survey, smokers were asked to judge only one risk—their own or the
2 average smoker's—so no respondents were asked directly whether they were better off
3 than other smokers. Smokers in this large, national study did show substantial optimism
4 bias, even though this was a telephone survey. U.S. Exhibit 17,736 (HINTS Survey,
5 2004).

6 **Q: How well known is the phenomenon of “optimism bias?”**

7 A: Optimism bias is one of the best documented and most consistent phenomena in risk
8 perception research. There are literally hundreds of studies that demonstrate optimism
9 bias. Optimism bias is not restricted to a narrow set of conditions, but appears in
10 investigations of many different groups of individuals, with different questioning
11 methods, and with nearly all hazards. The magnitude of this bias (i.e., the difference
12 between risk estimates for oneself and for others) varies from hazard to hazard, but it is
13 particularly large with hazards, like lung cancer, that are believed to be preventable by
14 individual action. In the academic literature, studies show strong optimism bias in both
15 adolescents and adults.

16 **Q: Has optimism bias been demonstrated in studies for smoking?**

17 A: Yes, optimism bias has been demonstrated in studies specifically focusing on smoking.
18 In fact, as I mentioned earlier, smokers display optimism bias in the great majority of
19 such studies.

20 **Q: How does optimism bias work?**

21 A: As I mentioned earlier, smokers hold many beliefs that they can use to convince
22 themselves that their own risk is not as great as that of other smokers (for example, that
23 they exercise more than other smokers or that they smoke cigarettes with less tar and

1 nicotine). Other studies have revealed a variety of additional mechanisms or
2 rationalizations used by smokers to minimize their risk. For example, smokers can
3 reassure themselves by believing that only people who have smoked longer than they
4 have smoked will suffer adverse health effects. Consistent with this suggestion, long-
5 term smokers were more likely than short-term smokers to claim that it takes many years
6 of smoking to produce health problems. U.S. Exhibit 17,736 (Hahn et al., 1998).

7 **Q: Does optimism bias apply to younger smokers?**

8 A: Yes. Studies have shown this. One example is a peer-reviewed, published study of 10-18
9 year olds (median age of 14) that concluded that adolescent smokers “engage in
10 significant denial” about their own risk of harm from smoking cigarettes. In this study,
11 the authors asked students to estimate the probability of four smoking-related conditions,
12 including heart trouble, cancer, breathlessness, and carbon monoxide in the blood. They
13 found that adolescents rated the hypothetical risk that they would experience if they
14 became a regular smoker to be lower than the risk for another smoker, even though the
15 two were said to have the same amount and duration of smoking. U.S. Exhibit 17,736
16 (Hansen & Malotte, 1986, p. 363).

17 **Q: Can you provide another example?**

18 A: Yes, the peer-reviewed published Cohn et al. study asked 376 teenagers (average age of
19 15.2 years) about their risk of 19 health problems and negative life events, one of which
20 was “get[ting] hooked on cigarettes.” This study found that teenagers claimed that they
21 were less likely than their peers to get “hooked.” This optimism was as great or greater
22 than their optimism about avoiding any of the other 18 hazards studied, with the single
23 exception of “get[ting] hooked on drugs like marijuana.”

The study also examined adolescents' perceptions of certain risky activities, including using cigarettes, compared to their parents' perceptions of how risky the activities would be for their child. Both the adolescents and their parents rated the riskiness of each activity when performed at different levels of frequency. In each case – whether the risky activity was described as "experimental," "occasional," or "frequent" – "[a]s expected, teenagers rated the activities [including the use of cigarettes] as significantly less harmful than did their parents." U.S. Exhibit 17,736 (Cohn et al., 1995, p. 220).

Q: How do you interpret these results?

A: The Cohn study shows that teens tend to believe that they are less at risk to become addicted than other teens and that they can smoke without much chance of becoming addicted. Furthermore, they rate occasional cigarette use as less harmful than adults' ratings. These two beliefs – that short term use is not very risky and they personally are not the ones who will have trouble quitting – contribute to experimentation and eventual addiction.

Q: Can you sum up your conclusion regarding the third factor, that is, an understanding by smokers of their own vulnerability to harm?

A: It is my conclusion that most smokers severely underestimate the extent to which smoking increases their own risks of life-threatening illnesses. Furthermore, most think their own smoking pattern places them at less risk than other smokers. For these reasons, the decisions smokers make to continue smoking (or that nonsmokers make when starting smoking) are not made in full awareness of the risks they are facing.

1 **D. Factor Four: An Understanding of the Ease or Difficulty With Which the**
2 **Harm Can Be Avoided**

3 **Q: Please remind the Court of the fourth factor.**

4 A: The fourth factor is an understanding of the ease or difficulty with which the harm can be
5 avoided.

6 **Q: How is this factor relevant to smoking?**

7 A: The risk involved in any decision or action depends on the difficulty of reversing that
8 decision or action and the extent to which the harm itself is reversible. In the case of
9 smoking, a very important aspect of the risk is the difficulty of changing one's mind and
10 quitting after one has begun to smoke. Thus, for smoking, one must ask whether people
11 have an accurate knowledge of the difficulty of stopping smoking.

12 **Q: What is your conclusion about smokers' understanding of the ease or difficulty of
13 avoiding harm from smoking?**

14 A: The research evidence shows that, because smokers underestimate the power of addiction
15 and how hard it is to quit, smokers do not adequately understand the difficulty of
16 avoiding the harms caused by smoking.

17 **Q: How do you assess this factor for smoking?**

18 A: There are several questions that help to assess people's understanding of the ease or
19 difficulty of avoiding the harmful effects of smoking. These include: (a) Especially at the
20 time when they first begin to smoke, do smokers think that they will be able to quit if they
21 so choose? (b) Do smokers and potential smokers realize the addictive power of
22 cigarettes? (c) Do smokers underestimate the difficulty of quitting? and (d) Do smokers
23 think that they can quit more easily than other smokers?

1 **Q: Do surveys ask smokers about their addiction to smoking?**

2 A: Yes. Research shows that 81% of adult smokers said that if they tried to quit for just a
3 day, they experienced strong cravings for cigarettes. Of these, 95% said that the cravings
4 were stronger than what they had expected when they began to smoke. Fewer adolescent
5 smokers – 46% – reported that they would experience strong cravings if they tried to quit.
6 Among those adolescents who said they experienced such cravings, 85% said that the
7 cravings were stronger than what they had expected when they began to smoke. U.S.
8 Exhibit 17,736 (Weinstein & Slovic, 2001). Thus, people underestimate the addictive
9 power of nicotine when they first become smokers.

10 **Q: Do people give any thought to quitting or how long they will smoke when they start
11 to smoke?**

12 A: Most smokers give no thought to how long they will smoke when they first begin. They
13 apparently believe that quitting is something that can be decided later. But, of course, by
14 then, addiction can make it extremely difficult to quit. It is important to note that
15 considering the possibility of changing one's decision is part of making an informed
16 decision to expose oneself to a hazard like smoking.

17 **Q: What data support your conclusion?**

18 A: In a large national survey, 24% of youth smokers said they expected to smoke for less
19 than a year, 10% said one to five years, and only 5% said they expected to smoke longer
20 than five years. However, a much larger proportion, 61% said they had never thought
21 about it. The corresponding figures for adult smokers were: less than one year - 12%, one
22 to five years - 5%, longer than five years - 7%, and never thought about it - 76%. U.S.
23 Exhibit 17,736 (Annenberg, 2001; Slovic, 2001).

1 **Q: What do adolescent smokers believe about the ease or difficulty of quitting?**

2 A: The data show that adolescents agree that it is hard for other smokers to quit, but they
3 believe that they will be able to quit more easily than other smokers. For example, 96%
4 of our teen respondents believed that it is “hard,” “very hard,” or “almost impossible” for
5 a half-pack-a-day smoker to quit, and 96% agreed that the longer you smoke the more
6 difficult it is to quit. However, 43% of the teen smokers in our survey told us that they,
7 personally, would find it easy to quit and never smoke again, and a mere 16% said it
8 would be either “very hard” or “almost impossible” for them. Teenagers’ reluctance to
9 give up this reassuring illusion is demonstrated by the finding that, even among teens who
10 had already made a serious quit attempt and failed, 32% still said it would be easy for
11 them to quit. U.S. Exhibit 17,736 (Weinstein & Slovic, 2001).

12 **Q: Did you ask smokers who said they planned to quit whether they thought they
13 would be successful in their quit attempts?**

14 A: Yes, we did. In the Annenberg survey, we asked smokers who said that they planned to
15 try to quit in the next year, “If we called you again in a year, would you guess you would
16 have successfully quit smoking?” A very high 83% of youths and 78% of adults said they
17 expected to succeed in their quit attempt. U.S. Exhibit 17,736 (Slovic, 2001). The
18 reality, however, is that only 28% of teenage quitters manage to quit smoking for a year
19 (U.S. Exhibit 17,736 (Brick, Farrelly, & Mowery, 2000)), and only 7% of adults smokers
20 who try to quit are able to remain cigarette free for a year. U.S. Exhibit 17,736 (U.S.
21 Department of Health and Human Services, 2000).

22 In another survey we conducted, we asked smokers who were planning to quit in
23 the next year, and who had tried and failed in the past, about their next quit attempt.

1 From this group, 88% of youths and 64% of adults said that they would be nonsmokers a
2 year later. Even among those who stated that quitting was very hard or almost impossible
3 for others, 83% of youths and 57% of adults predicted their own success. U.S. Exhibit
4 17,736 (Weinstein & Slovic, 2001; correction of data in Weinstein et al., 2004b).

5 **Q: Have other studies asked similar questions?**

6 A: Yes, in the University of Michigan's Monitoring the Future survey, high school seniors
7 were asked, "Do you think you will be smoking cigarettes 5 years from now?" These
8 same seniors were contacted 5 years later. The results showed that both light smokers
9 and heavy smokers overestimated the likelihood that they would have quit:

10 Of seniors who smoked less than one cigarette per day,
11 approximately 85% stated that they probably or definitely would
12 not still be smoking after 5 years. When the same group was
13 polled five years later, 58% were still smoking. Almost one third
14 of seniors who smoked a pack a day thought that they, too, would
15 quit within five years. But only 13% actually quit.

16 U.S. Exhibit 17,736 (Lynch & Bonnie, 1994, p. 50-53).

17 These data from the Monitoring the Future survey and other recent surveys show
18 that adolescents seriously underestimate the likelihood that they will continue smoking
19 cigarettes, even if they want to quit.

20 **Q: Do occasional smokers see themselves as smokers?**

21 A: We learned that a substantial portion of low frequency smokers say that they do not even
22 consider themselves to be smokers. For example, 51% of teens who average 1 to 5
23 cigarettes each day do not consider themselves smokers, and 35% of adults who average
24 this amount don't consider themselves smokers. U.S. Exhibit 17,736 (Weinstein &
25 Slovic, 2001).

1 **Q: What is the import of this phenomenon that smokers do think of themselves as**
2 **smokers?**

3 A: Information about risks is not likely to have much impact if people who smoke cigarettes
4 can convince themselves that they are not really smokers.

5 **Q: Please sum up your conclusion related to the fourth factor.**

6 A: The evidence is quite clear. As a general concept, smokers and nonsmokers agree that
7 quitting is difficult. Nevertheless, teenage and adult smokers greatly overestimate the
8 likelihood that their own quit attempts will succeed. In fact, nearly half of teenage
9 smokers say that quitting will be easy for them. Furthermore, the evidence indicates that
10 people fail to consider the difficulty of quitting when they start to smoke and do not
11 recognize how strong the cravings produced by addiction can be. My conclusion based
12 upon this research is that people have insufficient understanding of the difficulties of
13 avoiding the harms of smoking to make an informed decision about beginning to smoke.

14 **Q: So, in sum, would you please state briefly for us how the application of these four**
15 **factors support your overall conclusion?**

16 A: I have concluded that smokers have a seriously deficient understanding of the risks of
17 cigarettes and that, in particular, adolescents' understanding is insufficient to make
18 informed decisions about becoming smokers. For each one of the four factors that
19 represent the minimum information necessary to make an informed decision about a risk,
20 smokers' knowledge is seriously deficient. On topic after topic—what illnesses can be
21 produced by smoking, what these illnesses are like, how much smoking increases the
22 likelihood of these illnesses, how much smoking increases their own risk, the power of
23 addiction, and the low rate of successful quit attempts – people are either unaware of the

1 risk or substantially underestimate its magnitude. Smokers and prospective smokers do
2 not have sufficient information to make an informed decision about whether they will
3 begin to smoke or continue smoking.

4 **Q: From your understanding of the research related to each of the four factors in
5 understanding risk that you have discussed, what does a typical smoker understand
6 about the risks of smoking?**

7 A: According to the evidence, a typical smoker will generally report that smoking is
8 unhealthy, but she can name only two of the many illnesses caused by cigarettes. A
9 typical smoker overestimates the curability of lung cancer and emphysema, and does not
10 realize that smoking kills more people than auto accidents, AIDS, guns, and alcohol
11 combined. A typical smoker does not think about risk in terms of numerical probabilities,
12 and so, if asked to provide numerical risk statistics, will overestimate some risk statistics
13 and underestimate others. A typical smoker is convinced that other smokers smoke more,
14 inhale more, and smoke higher tar cigarettes than he does. A typical smoker thinks that
15 her risks of lung cancer and heart disease are, in her own words, only "a little" higher than
16 nonsmokers' risks. A typical smoker gave no thought to addiction or quitting when first
17 starting to smoke and has subsequently discovered that nicotine cravings are stronger than
18 expected. Even though a typical smoker will acknowledge that other smokers have
19 trouble quitting, he is convinced that his next attempt to quit smoking will be successful.
20 Teenagers, especially, think that quitting will be relatively easy for them.

21 This description reflects what we research shows about the knowledge and beliefs
22 of a typical smoker; research also shows that half of smokers understand even less of the
23 risks they are incurring. My conclusion, taking the full range of relevant evidence into

1 account, is that in all important respects, smokers think that smoking is less dangerous
2 than it really is.

3 **Q: Thank you, Dr. Weinstein.**

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